Contract No. EP-W-06-006

VASQUEZ BOULEVARD/INTERSTATE 70 SUPERFUND SITE
OPERABLE UNITS 2 (OMAHA AND GRANT SMELTER) AND 3 (ARGO SMELTER)
CITY AND COUNTY OF DENVER, COLORADO

REMEDIAL INVESTIGATION/FEASIBILITY STUDY PHASE II

PACIFIC WESTERN TECHNOLOGIES, LTD.

SITE-SPECIFIC HEALTH AND SAFETY PLAN

Work Assignment No. **123/125-RICO-089R**

Work Assignment Name: **Vasquez Boulevard/Interstate I-70 RI/FS**

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Phone Number: **303 274-5400 ext. 54**

Date: March 6, 2012

Revision	Prepared	Reviewed	Approved	Date
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1.0 INTRODUCTION

1.1 Plan Objectives

The Vasquez Boulevard/Interstate 70 Superfund Site (VB/I-70 Site) is an area of approximately 4.5 square miles located in north-central Denver. Historically, this area was a major smelting center for the Rocky Mountain West where gold, silver, copper, lead, and zinc were refined. The site activities will be conducted at Operable Unit (OU) 2 which is in the area where the former Omaha & Grant Smelter was located and OU 3 where the former Argo Smelter operated. The contaminants of concern are arsenic, lead, cadmium, copper, and zinc in soil and groundwater at OU 3 and only arsenic in groundwater at OU 2. A known cadmium plume will be investigated in OU 3. Volatile organic compounds (VOCs) and semi volatile organic compounds (SVOCs) may occur, but are not thought to be elevated in either OU 2 or OU 3.

This Site-Specific Health and Safety Plan (HASP) has been prepared to comply with the requirements of the Occupational Safety and Health Administration (OSHA) under 29 CFR 1910.120 and 29 CFR 1926.65 (b).

This plan was prepared for Pacific Western Technologies, Ltd. (PWT) employees for field activities conducted at the VB/I-70 Site (OU 2 and OU 3). All other agencies or PWT subcontractors must possess and adhere to their own HASP for the activities that they perform on the site and/or this HASP with prior written approval, whichever is more stringent.

This project entails:

- Characterization and sampling
    - Soil sampling using direct push methods
    - Surface water grab sampling
    - Installation of groundwater wells
    - Groundwater sampling
    - Activities will occur in and around operating businesses and residences
- Daily supervision and management of subcontractors (drilling/direct push sampling)
- Community involvement interviews
- Disposal of investigation-derived waste

The purpose of the plan is to:

- Document known site-specific health and safety hazards within the project area.
- Prescribe mandatory, uniform operating procedures for all PWT personnel on the site to be followed in order to address these health and safety hazards.
- Clarify roles and responsibilities and assign PWT personnel responsibilities on the site with regard to health and safety issues.
- Establish personal protective equipment (PPE) requirements for personnel involved in the various field tasks associated with remedial investigation at the site.

A copy of this plan will be kept on-site at all times during field activities.

1.2 Plan Revisions

Work conditions may change as the project progresses. As appropriate, addenda to the HASP will be provided by the Health and Safety Coordinator (HSC). Prompt notification of changing work conditions requiring possible modification of this plan is the responsibility of the HSC. Additional field tasks with

unique hazards or risks may also require addenda to this plan. In addition, procedures and equipment specified in this plan will be reviewed and updated as new technologies and equipment are developed. In any event, no changes to this plan will be implemented without prior approval of the Project Manager (project personnel are identified in Section 1.6 and described in Section 2.0).

Attachment B of this plan will be reserved for plan addenda. Addenda to the plan will be added to Attachment B as needed during the course of the project. The addenda will be identified by letter and will refer to the latest current revision of the plan (e.g., the first addendum to this plan will be Addendum 1B). Each person with a copy of this plan will be provided with each addendum. The HSC will keep a list of those persons who have a copy of this plan.

1.3 Site Location and Background

The VB/I-70 Site is an area of approximately 4.5 square miles located in north-central Denver. Historically, this area was a major smelting center for the Rocky Mountain West. Three smelting plants: Omaha & Grant, Argo, and Globe operated in the area for varying lengths of time, beginning as early as 1870, refining gold, silver, copper, lead, and zinc.

The VB/I-70 Site is divided into three OUs for the purposes of better managing the project. OU 1 focuses on residential soils and includes all or parts of the following north-center Denver neighborhoods: Cole, Clayton, Swansea, Elyria, Globeville, and a small section of Curtis Park. The U.S. Environmental Protection Agency (EPA) and the Colorado Department of Health and the Environment (CDPHE) began investigating these residential yards in 1998 to determine if arsenic, lead, cadmium, or zinc residues from past smelting operations posed a potential threat to the health of residents. The investigation showed that lead and arsenic were the contaminants of concern and sampling results found elevated lead and arsenic concentrations in some yards. OU 1 is not addressed under this HASP.

OU 2 is in the area where the Omaha & Grant Smelter was located and groundwater sampling will be conducted in this area under this HASP and associated Quality Assurance Project Plan (QAPP).

OU 3 is the area where the former Argo Smelter operated and is bounded by 48th Avenue on the north, 46th Avenue on the south, Broadway Street on the east, and Huron Street on the west. The historic smelter buildings have been demolished and the area has been commercially and industrially redeveloped. During the course of previous investigations at OU 3 and at the ASARCO Globe Plant, a cadmium groundwater plume was identified east of OU 3 and south of the ASARCO Globe site.

The objective of the Phase II Remedial Investigation (RI) is to further delineate a contaminated groundwater plume and identify the source of the plume in surface and subsurface soil. The objective of the Phase II Remedial Investigation/Feasibility Study (RI/FS) is to develop the amount of data necessary to support the selection of an approach for site remediation. The goal of the post-RI/FS support is to develop a well-supported Record of Decision (ROD).

1.4 Stop Work Authority

It is PWT's policy that all workers have the responsibility and authority to stop work if they believe that an imminent danger situation exists, and immediately report this situation to their supervisor. All imminent danger situations shall be immediately reported to their supervisor, PWT's HSC, and the PWT Project Manager.

1.5 Scope of the Remedial Investigation

The scope of the Phase II RI/FS is to develop the data necessary to support the selection of an approach for site remediation.

The scope of the Phase II RI/FS will include the following outlined tasks:

- Obtain access agreements
  - Contact property owners for permission to sample on their property
- Soil sampling during soil boring and monitoring well installation
  - Continuously core each bore hole
  - Log lithology
  - Collect soil samples for chemical, physical, and geotechnical parameters
- Monitoring well installation and development
  - Use conventional hollow-stem auger and direct push methods
- Collect groundwater samples
  - Use newly installed and/or existing groundwater wells
  - Collect groundwater samples for chemical and water quality parameters
- Collect surface water samples
  - Collect surface water samples for chemical and water quality parameters
- Surface soil sampling for potential source areas
- Aquifer testing
- Dispose of investigation-derived waste
  - Characterize and dispose of field-generated waste in accordance with local, state, and federal regulations.
- Well surveying and groundwater elevation measurements

1.6 Project Personnel

The provisions of this HASP are mandatory for all PWT personnel assigned to the project. A copy of this plan will be made available to all PWT personnel, subcontractors, and authorized visitors that may enter the site. Site personnel will also complete the "Safety Compliance Agreement" in Attachment C. This HASP was prepared in accordance with the PWT's corporate Health and Safety Plan.

Contact information and emergency support are provided in Table 1.

Table 1
Vasquez Boulevard/I70 Site
Contact Information

EPA Remedial Project Manager:	Paula Schmittdiel U.S. Environmental Protection Agency Region 8	Work: 303-312-6247
ENSE Division Health and Safety Coordinator:	Dorthea Hoyt	Work: 303-247-5400 x54
PWT Corporate Health and Safety Officer:	Charles Champion	Work: 303-274-5400 x43
PWT Project Manager/ Health & Safety Coordinator:	Steve Singer	Work: 303-274-5400 x53 Cell 303-902-9386

Nearest Hospital:

North Suburban Medical Center – HealthOne
9191 Grant St, Thornton
303.451.7800
http://www.northsuburban.com

Police:	911
Fire Dept.:	911
Emergency Medical Service (ambulance):	911

2.0 ASSIGNMENT OF HEALTH AND SAFETY RESPONSIBILITIES

This section describes the roles and responsibilities of the site personnel relative to health and safety.

2.1 PWT Project Manager

The PWT Project Manager coordinates all activities for the project. The Project Manager will have the responsibility to interface with the PWT Environmental Services (ENSE) Division Health and Safety Coordinator, the PWT Corporate Health and Safety Officer, other members of the PWT team, EPA, contractors, and subcontractors. Project Managers are responsible for the occupational health and safety of project team members under their supervision, and for enforcement of health and safety policies. These responsibilities are listed below. The PWT Project Manager may utilize the services of a Certified Industrial Hygienist (CIH), under subcontract to PWT, to assist in performing these duties.

- Ensuring that there is a suitable site-specific HASP is in place for PWT project personnel and PWT's subcontractors.
- Reviewing and approving the site-specific HASP.
- Identifying site hazards and ensuring they are appropriately addressed in the site-specific HASP.
- Providing technical input for the pre-entry briefing and tailgate safety meetings when required.
- Interfacing between responsible parties, subcontractors and PWT regarding health and safety issues which might arise.
- Removing individuals from the site for deliberate violations of the HASP and/or health and safety policies/procedures.
- Ensuring that procedures are developed for safe and healthful site operations, in conjunction with the ENSE Division Health and Safety Coordinator and CIH support.
- Ensuring personnel have had the appropriate level of training needed for site operations prior to the start of field work.
- Assigning project team responsibilities.
- Completing OSHA Form 300 for the project and forward a completed copy to the PWT headquarters and ensure it is posted at the work site.
- Ensuring that all visitors to sites under PWT's control are aware of the requirements of the site health and safety plan(s).

2.2 Health and Safety Coordinator

In general, the PWT Project Manager will serve as the on-site HSC. However, in their absence, the HSC will be designated as the ranking personnel on site at any given time. The HSC will have the responsibility for PWT Team implementation of the plan during actual field operations. The designated HSC will report directly to the PWT Project Manager on a daily basis to provide work progress reports. These responsibilities include the following:

- Ensuring that all PWT personnel comply with this HASP.
- Performing a detailed hazard analysis for each PWT work activity prior to starting that activity. For activities conducted by subcontractors, the HSC will ensure that the subcontractor has prepared a detailed hazard analysis for those activities. PWT employees will comply with the subcontractors hazard analysis requirements.
- Ensuring site personnel are briefed on site health and safety hazards and the contents of the HASP.
- Conducting the pre-entry briefing with personnel visiting the site.

- Maintaining documentation (field log book, sampling data, training, visitor list, entry/exit logs etc.) of site activities as appropriate.
- Conducting periodic meetings (tool box talks, tailgate, etc.) with site employees to discuss site safety and health issues, (note: it is expected that subcontractors will conduct daily tailgate safety meetings during implementation of the sampling activities. Attending the subcontractor tailgate meetings fulfills this responsibility).
- Enforcing the "buddy system" for field activities when applicable.
- Reviewing training records of site personnel, to include subcontractors, to ensure they are qualified to perform field activities.
- Informing personnel involved in the field operations of the proper procedures during emergencies.
- Serving as the point of contact for emergency services responding to the site.
- Observing personnel for signs and symptoms of exposure to hazardous site conditions or stress.
- Assisting the Project Manager during illness/injury investigations.
- Immediately reporting any unusual or unsafe conditions to the Project Manager.
- Verifying that all PWT employees under their leadership work in a safe manner according to PWT policies and this plan.
- Notifying the Project Manager of any significant changes in the field work program.
- Provide first aid and/or cardiopulmonary resuscitation (CPR) if necessary on site.
- Perform site audits to verify adherence to the requirements of the HASP.
- Modifying health and safety equipment or procedures based on data gathered at the work site.
- Dependent on site conditions, revising the HASP to reflect new health and/or safety issues.
- Stopping operations for health and/or safety situations which pose an immediate threat to site personnel as well as issuing start work orders once these situations have been corrected.

2.3 PWT Corporate Health and Safety Officer

The roles and responsibilities of the PWT Corporate Health and Safety Officer are defined in the PWT Corporate Occupational Health and Safety Plan. These roles and responsibilities are restated here to aid project teams in having information on responsibilities in one document. The PWT Corporate Health and Safety Officer are responsible for developing and maintaining the corporate health and safety program and coordinating its implementation. Specific responsibilities that are applicable to the VB/I-70 Site include but are not limited to:

- Be available for consultation with ENSE Division Health and Safety Coordinator, Project Managers, and Project Health and Safety Coordinators.
- Modify health and safety equipment, PPE, or procedures based on data gathered at the site.
- Provide review and critique of emergency response actions, if any, required during performance of field activities.
- Assist the ENSE Division Health and Safety Coordinator and the Project Manager in ensuring that proper health and safety equipment is available for the project.
- Approve personnel to work on the site with regard to medical examinations and health and safety training.

The PWT Corporate Health and Safety Manager may utilize the services of a CIH, under subcontract to PWT, to assist in performing the duties listed above.

2.4 ENSE Division Health and Safety Coordinator

The ENSE Division Health and Safety Coordinator will work as a liaison between the PWT Corporate Health and Safety Officer and the ENSE project teams. Responsibilities include reviewing the *Site-Specific Health and Safety Plans* for projects:

- Reviewing *Minimum Health and Safety Requirements* documents for bid document and subcontracts
- Review emergency response actions, if any, required during performance of field activities
- Supporting health and safety needs and questions of ENSE Division Project Managers and Project Health and Safety Coordinators, with the support of the PWT CIH Subcontractor
- Supporting Project Managers in planning sufficient budget and schedule for appropriate health and safety planning, documentation, and audits for ENSE projects
- Assisting Project Managers in coordinating health and safety audits of field work
- Assisting Project Teams in the review of subcontractor Task-Specific Health and Safety Plans
- Assisting Project Teams and PWT Procurement in addressing health and safety requirements in subcontracts and/or services obtained through purchase orders.
- Tracking OSHA 40 Hour and 8 Hour training status for the ENSE Division employees, in coordination with PWT Human Resources
- Defining and tracking medical monitoring requirements for the ENSE Division, and coordinating medical monitoring with PWT Human Resources and with the PWT Occupation Health Physician

2.5 PWT CIH

The CIH, under subcontract to PWT, will provide the health and safety expertise necessary to support the PWT Project Manager and the PWT Corporate Health and Safety Manager in performing their health and safety responsibilities. The CIH may assist PWT in the following:

- Ensuring that the PWT site-specific HASP is suitable to address the safety and health hazards at the site and of the removal action.
- Determining appropriate PPE.
- Determining the need for and type of respiratory protection.
- Determining necessary medical monitoring for PWT employees for the scope of the remedial investigation.
- Aiding the HSC in performing their duties, as necessary.
- Determining appropriate engineering controls to reduce the potential for exposure, as necessary.
- Determining necessary personal or environment monitoring requirements.

2.6 Subcontractors

All PWT subcontractors shall bear the ultimate responsibility for all matters dealing with safety in the performance of their work. This responsibility includes the safety of all persons and property and any and all employees of the subcontractor or lower-tier subcontractors that may perform work on their behalf, as well as compliance with all applicable health and safety regulations, specifically OSHA regulation 29 CFR 1910.120 and 29 CFR 1926.65. This requirement will apply continuously regardless of time or place, and will in no way be altered because PWT personnel provide general directions as to the location where work should be performed and/or samples taken. The subcontractor, their employees and any and all employees of lower-tier subcontractors that may perform work on their behalf, may be required to work with potentially hazardous substances. The HSC will, to the best of their ability, inform subcontractors or their representatives of any potential fire, explosion, health, or other safety hazards that have been identified during operations. A copy of this plan shall be made available to all subcontractors working at the site.

3.0 HAZARD EVALUATION

This section outlines the general scope of activities associated with the community engagement and remedial investigation supplemental sampling at the VB/I-70 Site that may pose some hazards to PWT Team employees or contractors. Evaluations of physical, chemical, and biological hazards follow the descriptions of activities. Additional Safe Work Practices for General Field Work, Drilling, and Use of Heavy Equipment can be found in Attachment A.

The remedial investigation actions at the VB/I70 Site will primarily involve the following:

- Assist EPA with obtaining access agreements
    - May include face-to-face interviews and/or discussions with residents regarding access agreements
- Drill soil borings and collect split-spoon samples
    - Use of heavy equipment, primarily a direct push drill and auger rigs
    - Collect soil samples of contaminated soil
    - Work in and around an active businesses and residential areas
- Collect groundwater and surface water samples
    - Collect potentially contaminated groundwater and surface water samples
- Dispose of investigation-derived waste
    - Containerize soil cuttings and purged groundwater for future treatment and disposal, primarily using 55 gallon drums
    - Dispose of sampling equipment and PPE as refuse
- Conduct aquifer tests
    - Contact with potentially contaminated groundwater

3.1 Physical Hazards

Physical hazards associated with drilling, sampling, and other investigation activities pose a significant potential for injury in addition to potential for chemical exposure. While the subcontractors will be operating the heavy equipment, PWT employees and other subcontractors shall be aware of physical hazards associated with the activities and implement all applicable health and safety practices. As discussed in the following subsections, physical hazards can be posed by:

- Heavy Equipment and Drill Rigs
- Noise and Vibration
- Weather
- Slip, Trip and Fall/ Uneven Walking and Working Surfaces
- Underground and Overhead Utilities
- Fire

Injuries that may result from these physical hazards can range from simple slip-trip-fall types of accidents to casualties, including fatalities due to moving and/or rotating heavy equipment or electrocution. Injuries resulting from physical hazards can be avoided through the adoption of safe work practices and employing caution when working with machinery.

All personnel shall be conscious of their work environment and should notify the HSC or other appropriate supervisory personnel of any unsafe conditions. The HSC will ensure that all site workers are informed of any physical hazards related to the site. All personnel should also familiarize themselves with other subcontractors' safety procedures.

3.1.1 Drill Rigs

Operation of heavy equipment in drilling activities presents potential physical hazards to personnel. The following PPE shall be worn whenever such equipment is present: steel-toed work boots, safety glasses or goggles, high visibility (e.g., orange) safety vests, and hard hats. Personnel should at all times be aware of the location and operation of heavy equipment, and take precautions to avoid getting in the way of their operation. Personnel walking or driving in the vicinity of heavy equipment shall make eye contact with the heavy equipment operators before approaching or traveling near heavy equipment. Personnel driving vehicles in areas where there is heavy equipment shall ensure their headlights are on. Personnel working near heavy equipment shall not turn their back to the equipment and shall keep the equipment in sight at all times. Personnel shall not pass under an elevated boom or attachment. If personnel need to approach heavy equipment (e.g., to speak to the equipment operator), hydraulic attachments shall be placed in a "zero energy" state. Attachment A includes additional safety practices for personnel working around heavy equipment and drill rigs.

3.1.2 Noise and Vibration

Drilling activities may produce noise levels above acceptable standards. High noise levels can contribute to hearing loss as well as interfere with communication between workers. Exposure to noise can be expected when working around equipment and machines such as heavy equipment, jack-hammers, etc. PWT personnel working in or around heavy equipment will not be monitored using personal dosimeters to characterize the noise exposure during a full 8-hour shift because PWT personnel are not required to be in close proximity to the drill rig. For this project, noise mitigation will be accomplished through mandatory use of hearing protection (i.e., either ear plugs or muffs) within the exclusion zone, and by locating, sampling, and logging activities at a distance from the drill rig that mitigates noise levels from interfering with normal speech level communications. Noise monitoring will be re-evaluated whenever a change in production, process, equipment or controls increase noise exposures such that additional employees may be exposed at or above the action level or that the attenuation provided by hearing protectors is rendered inadequate. All job classes and/or personnel that are suspected of having potential noise exposures above the OSHA action level (85 dBA TWA) may be monitored. Unless all noise sources have been properly characterized as not needing hearing protection, all personnel shall wear hearing-protective devices within the exclusion zone established around the operating equipment, or when noise levels interfere with normal speech. Hand signals will be established by on-site personnel, as appropriate, to facilitate communications while involved in high-noise activities. Drilling equipment and related activities may also provide persistent vibration.

3.1.3 Adverse Weather Conditions and Temperature Extremes

Adverse weather conditions are important considerations when planning and conducting site operations. Hot or cold weather can cause physical discomfort, loss of efficiency, and personal injury. Whenever ambient air temperatures are below 40°F or above 80°F the following protocols will be observed.

When air temperatures exceed 80°F, the following general practices will also be followed:

- Site workers should consume sufficient fluids to remain hydrated;
- Routine breaks in shaded areas must be taken;

- In hot weather, activities which will require the use of protective clothing or respiratory protection will be performed in the early morning or late afternoon, when practical; and
- In hot weather, the number of workers required to wear protective clothing will be minimized, as practical.

Heat exhaustion is the least severe manifestation of heat stress. Symptoms of heat exhaustion are: heavy sweating, extreme weakness or fatigue, dizziness, confusion, nausea, clammy, moist skin, pale or flushed complexion, muscle cramps, slightly elevated body temperatures, and fast and shallow breathing. If symptoms persist, move worker to a shady or air conditioned location and have them drink plenty of cool, clear fluids (water). If symptoms of heat stress are noted for a worker, the worker will be evaluated by measuring the heart rate for 30 seconds. The heart rate should not exceed 110 beats per minute; if it does, the next work period will be shortened by one third. If the pulse rate is 100 beats per minute at the beginning of the next rest period, the following work cycle should be shortened by one third.

When air temperatures are below 40°F, cold stress will be monitored for all workers. The most important factor in the prevention of cold stress is the wearing of adequate clothing. The HSC will ensure that all workers wear adequate clothing. In addition, when working in cold temperatures, the following procedures will be observed:

- Frequent breaks or rest periods will be provided and workers will have a shelter from wind and moisture;
- Hot drinks may be provided in some cases; and
- Opportunities to change wet clothing or to don additional clothing will be provided.

Workers will self monitor themselves and their co-workers for signs of cold stress. Symptoms of cold stress are: shivering; numbness; low body temperature; drowsiness; and weakness.

Employees shall wear sun screen at all times on exposed skin.

Suspend field operations in the case of severe weather and/or intense lightning (30 seconds from lightning flash to thunder sound). For lightning, seek shelter in project trailer or vehicle if caught in field from fast moving storm. There shall be at least 30 minutes since the last lightning strike before field operations resume.

3.1.4 Slips, Trips, and Falls/Uneven Walking or Working Surfaces

Protection from slip, trip and fall hazards will be provided through standard safety procedures including good housekeeping. Removing equipment and debris, and taking general precautions during site operations will be standard operating procedures. Workers will be apprised of any potential trip hazards through regularly scheduled health and safety meetings. Whenever possible, trip and fall hazards will be eliminated or clearly identified with yellow "caution" tape. This investigation includes collecting surface water samples from ditches and the Platter River. Whenever possible, sampling should be conducted where the slope to the river or ditch is small. Loose or slippery areas should be avoided, if practicable. Use a long reaching pole or similar device to collect samples where a firm footing cannot be otherwise established.

Impalement hazards to workers will be neutralized as soon as they are identified. Three points of contact will be maintained when climbing on and off equipment or ladders. Subcontractors are responsible for the use of safety belts, lifelines, lanyards, safety nets, etc., for safeguarding their employees or lower-tier subcontractors when performing elevated work in compliance with 29 CFR 1926.

If necessary to use a ladder, follow OSHA guidelines for safe use of ladders., including, but not limited to, maintaining 3 points of contact at all times; inspect ladders before each use; following safety instruction on the ladder label including weight restrictions, prohibitions on standing on the stop step, etc.; ensuring ladders are set of a stable, even surface, using fiberglass ladders where there is a potential electrical hazard.

3.1.5 Underground and Overhead Utilities

Before excavation or drilling activities begin, all utilities (i.e., electricity, natural gas lines, water lines, sewer lines, etc.) shall be identified and deactivated as needed. If possible, any natural gas lines should be purged to remove all potentially explosive gas. The deactivation of utilities, when necessary, should be certified by the proper utility company personnel and the certification record retained.

Before implementation of the drilling-related investigative tasks, the area shall be inspected for overhead utility hazards. Alternate routes for tall equipment shall be identified if there is a potential to contact overhead utilities.

3.1.6 Fire

A type 10-B fire extinguisher shall be provided in each operations vehicle and on each drill rig or other piece of heavy equipment. All extinguishers will be inspected serviced, and maintained. Inspections shall be recorded on the inspection tag attached to each extinguisher.

No burning of materials will take place at the site. The use of explosives at the site is prohibited. Only approved temporary heating devices shall be used. Temporary heating devices which are the open flame-type with exposed fuel below the flame and using such fuels as coal, oil, or wood are prohibited.

It is not expected that there will be any flammable liquids, including paints, used for investigation activities. If any of these materials are used during the project, they will be handled and stored in a manner to conform to National Fire Protection Association and OSHA requirements. The storage area will be located at a location approved by the HSC. "No Smoking Within 50 Feet" signs will be posted in and on all required storage areas and materials. Only authorized personnel will be allowed access to these areas when access is not required, they will be kept under lock and key.

During vehicle refueling, smoking and open flames are prohibited; equipment/vehicles shall be shut off.

3.1.7 Confined Space

Personnel shall not enter a confined space, or a suspected confined space, until all the required controls are in place as required by OSHA.

3.2 Chemical Hazards

Results from previous groundwater and soil sampling performed at the site indicate that chemical hazards may be encountered at the site during the planned remedial investigation sampling activities. Groundwater, surface water and soil may be contaminated with the following constituents: lead, arsenic, copper, zinc, and cadmium at OU 3 and only arsenic is anticipated to be present in groundwater at concentrations above the maximum contaminant level (MCL) at OU 2. Summary statistics tables from previous environmental sampling at OU 2 and OU 3 listing contaminant concentration ranges are included in Attachment H.

Material Safety Data Sheets (MSDS) for each of these chemicals are included in Attachment D.

It is possible that unexpected unknown sources of contamination may be present at the site. Chemical substances in gaseous, liquid, or solid form can enter the unprotected worker by inhalation, skin absorption, ingestion, or through a puncture wound (injection). A contaminant can cause damage at the point of contact or can act systemically in a different part of the body. Substances can pass through lung tissue into the bloodstream and on to other susceptible areas of the body. Since some toxic chemicals are not detectable by human senses, their toxic effects may not produce any immediate symptoms. Respiratory protection is therefore extremely important if there is a possibility that the worksite atmosphere may contain such hazardous substances.

The skin and eyes also represent important routes of exposure. Some chemicals directly affect the skin, while others may pass through the skin into the bloodstream where they can be transported to other vulnerable organs. Skin absorption is enhanced by abrasions, cuts, heat, and moisture. The eye is particularly vulnerable because airborne chemicals can dissolve in its moist surface and be carried to the rest of the body through capillaries located close to the surface of the eye. Protection against skin and eye contact may be provided by:

- Wearing protective equipment (nitrile gloves, protective clothing).
- Keeping hands away from the face.
- Minimizing contact with contaminated groundwater, surface water and soil.

Inadvertent ingestion can occur as a result of personal habits such as chewing gum or tobacco, drinking, eating, smoking cigarettes, and applying cosmetics. These practices may provide a route of entry for chemicals and are prohibited in work areas.

3.2.1 General Precautions

If signs of contamination different from those addressed in this plan are encountered, such as visible soil stains, unusual odors, or fibrous debris, stop all work in the area, barricade or otherwise isolate the area, and immediately contact the HSC. Protection of worker health and safety shall be the first priority. Continuation of work in the area and the amount of, if any, personal protective equipment shall be determined by the HSC. Other precautions to be undertaken to ensure a safe work place on this project where the potential for chemical exposure may exist include:

- No smoking, eating, or drinking in areas where contaminants may be present.
- Avoid the area immediately downwind of drilling activities.
- Contact with contaminated materials should be minimized through the knowledge of site conditions and the location of potential contamination based on previous site investigation reports.
- Minimize the creation of dust, through dust suppression such as water application.
- Adequately barricade all work zones to ensure public safety.

3.3 Biological Hazards

Biological hazards may include insect stings/bites (e.g., bees, wasps, ticks), snakes (e.g., western diamond back rattlesnakes, bull snakes), poisonous insects (black widow spiders, brown recluse), Hanta virus, Lyme disease, and/or wildlife bites. Areas of accumulated animal or bird droppings should be avoided. If work is required in such areas, sanitize animal fecal matter and animal carcasses with bleach solution and clean and containerize before performing any other work. Wear appropriate PPE. Avoid contact with snakes, spiders, and insects. Use insect repellant. Cover exposed skin to prevent insect bites.

During months when snakes are active, wear shake chaps in areas where debris and tall grass have not been removed.

3.4 Personal Safety

PWT Team employees and their contractors may need to enter a private residence to perform well monitoring, obtain an access agreement, or otherwise carry out their duties. Workers shall always enter a private residence in a team of at least two persons.

Unwelcoming animals may be present in residential yards. Workers are not to enter yards with such animals until the animal is safely restrained by the property owner.

4.0 TRAINING

4.1 General Training

Prior to initiation of field activities, all personnel shall have completed an initial 40 hour Hazardous Materials Health and Safety Course and 8-hour annual refresher course(s). All personnel shall also have a minimum of three days of actual field experience under the direct supervision of a trained, experienced supervisor. These courses cover chemical hazards, hazard recognition, hazard assessment and personal protective equipment. The HSC will have been trained in standard first aid measures and CPR.

All personnel who may participate in the site field activities shall be required to have completed appropriate training as specified in 29 CFR 1910.120(e)(3) (HAZWOPER training) prior to the initiation of site activities. The supervisor training requirement will also apply to the subcontractor/subcontractor supervisors. The subcontractor/subcontractor shall provide PWT with copies of written certificates documenting said training. Copies of training certificates for on-site personnel will be kept at the site in the possession of the HSC during the performance of field activities.

4.2 Site Information Programs

Prior to the initiation of each phase of fieldwork, all personnel who will participate in the site sampling work shall attend a pre-entry briefing. Information contained in this plan will be reviewed in detail at the pre-entry briefing, including:

- names of personnel responsible for site safety and health;
- safety, health and other physical and chemical hazards present on the site;
- use of personal protective equipment;
- work practices by which the employee can minimize risks from hazards;
- safe use of engineering controls and equipment on the site;
- medical surveillance requirement, including recognition of symptoms and signs which might indicate overexposure to hazards;
- frequency and types of air monitoring, personal monitoring and environmental sampling techniques and instrumentation to be used;
- site control measures;
- site decontamination procedures;
- emergency response procedures; and
- spill containment procedures.

In addition, all persons participating in field activities shall be required to read this HASP and sign a safety compliance agreement (Attachment C). Information discussed at the pre-entry briefing will be reinforced, in turn, during tailgate safety meetings (see below). Additional pre-entry briefings may be required for additional phases of work or if new personnel are assigned to the project.

Tailgate safety meetings will be conducted each day, or whenever new personnel arrive and/or when a unique work assignment warrants employee training. Tailgate safety meetings will be conducted by the HSC. These meetings will cover the projected work for the week or specific task and will review and reinforce good safety practices (e.g., proper protective clothing, effective deterrents of heat stress, etc). Information discussed at the tailgate safety meetings may be revised and updated, based on any new data obtained pertaining to site characterization and analyses.

An attendance record will be kept for the pre-entry briefing and for all subsequent tailgate safety meetings. In addition to documenting the persons in attendance, these records will include the date and time of the meetings and the subjects covered. A sample safety meeting attendance form is included in Attachment E.

4.3 Hazard Communication

PWT and PWTs subcontractors will inform each other and employees of potential hazards associated with chemicals (in addition to those already identified in Section 3.2 and Attachment D) brought to the site to perform various field activities. The information will be distributed in the form of MSDS. Copies of the MSDS for each chemical brought to the site will remain onsite during the period that the chemical is being utilized. Safe handling practices and emergency first aid for each chemical will be discussed during the pre-entry briefing, tailgate safety meetings, etc.

The Health and Safety Plan of all subcontractors shall also be available onsite and include hazard communication concerning the chemicals utilized by the subcontractor. Examples of chemicals that may be brought to the site for the sampling activities would include diesel fuel, motor oil, and hydraulic oil for heavy equipment.

4.4 Respiratory Protection Training

Employees shall have respiratory protection training in accordance with 29 CFR 1910.134 for those personnel who use or may need to use respirators. Respiratory protection shall follow the PWT Respiratory Protection Program (attached). The use of respiratory protection other than dust masks is not anticipated on this project.

5.0 AIR MONITORING REQUIREMENTS

Air monitoring is not anticipated to be necessary during implementation of this project. If site conditions change and air monitoring becomes necessary, an addendum will be prepared and included in Attachment B.

6.0 PERSONAL PROTECTIVE EQUIPMENT AND RESPIRATORY PROTECTION

6.1 General Requirements

PWT has developed and implemented a personal protective equipment program/respiratory protection program to comply with the requirements of 29 CFR 1910.120(g)(5) and 29 CFR 1910.134 and is included as Attachment F.

In designing the level of PPE for the site, the degree of risk for the four basic routes of exposure (inhalation, skin absorption, ingestion, and eye or skin contact) to potentially hazardous substances was evaluated. Action levels are stated in the specific MSDS located in Attachment D. When the established action levels are exceeded, actions will be taken to reduce potential exposure. Engineering controls are to be implemented first whenever possible. When engineering controls are not possible or prove to be insufficient, administrative actions followed by PPE will be used to limit potential exposure. For metals (arsenic, lead, cadmium, copper, and zinc) contaminated soil at OU 3, inhalation and soil ingestion have been identified as the primary sources of potential exposure at the site. Arsenic in groundwater is the principal source of exposure at OU 2. VOCs and SVOCs may be present at both OUs, but are not thought to be elevated.

6.2 Personal Protective Equipment Levels

The following sections describe the levels of personal protection for field work at the site. These levels are based upon previous field work performed at the site and the physical and chemical hazards at the site (Section 3.0). All site activities are anticipated to be performed in Level D protection.

6.2.1 Level D Personal Protection

The level of personal protection worn by personnel working on the site will be defined, controlled, and implemented by the HSC with guidance from the CIH. Protection may be upgraded or downgraded, on the basis of activity-specific conditions described above. Level D personal protective equipment includes the following:

- Work gloves (disposable nitrile or chemical-resistant, depending on task);
- Steel toe work boots (conforming to ANSI Standard Z 41.1);
- Hard hats (conforming to ANSI Standard Z 89.1);
- Eye protection (conforming to ANSI Standard Z 87.1);
- Hearing protection (when excessive noise is present);
- High visibility (e.g., orange) safety vest.

6.2.2 Modified Level D Personal Protection

Modified Level D personal protective equipment includes the following:

- Disposable Tyvek® coveralls (exchanged when heavily soiled or after breaks, at least once per work day);
- Work gloves (disposable nitrile or chemical-resistant, depending on task);
- Steel toe work boots (conforming to ANSI Standard Z 41.1);
- Hard hats (conforming to ANSI Standard Z 89.1);
- Eye protection (conforming to ANSI Standard Z 87.1);
- Hearing protection (when excessive noise is present);

- Respiratory protection (e.g., dust mask depending on task); and
- High visibility (e.g., orange) vest.

6.2.3 Level C Personal Protection

- Disposable Tyvek® coveralls (exchanged when heavily soiled or after breaks, at least once per work day);
- Work gloves (disposable nitrile or chemical-resistant, depending on task);
- Steel toe work boots (conforming to ANSI Standard Z 41.1);
- Hard hats (conforming to ANSI Standard Z 89.1);
- Eye protection (conforming to ANSI Standard Z 87.1);
- Hearing protection (when excessive noise is present);
- High visibility (e.g., orange) vest, and
- Full-face or half-face respirator with high efficiency particulate (HEPA) cartridge filter.

Inner gloves are optional for any of the above PPE levels. Inner gloves are typically thin, latex, nitrile or polyethylene gloves.

6.3 PPE Deviation/Modification

Protection levels may be upgraded, downgraded, or modified as deemed necessary by the HSC, with concurrence from the CIH, based upon work task or site-specific, safety-related factors such as:

- When excessive noise levels exceed 85 dba, hearing protection is required;
- Change in work tasks within a work area/exclusion zone, or work that begins on a different portion of the site;
- Change of season/weather;
- When temperature extremes or individual medical considerations (i.e., heat stress, medication, etc.) limit the effectiveness of PPE;
- Contaminants other than those previously identified are encountered;
- Change in ambient levels of contaminants; and
- Change in work space which affects the degree of contact with contaminants.

6.4 Limitations of PPE

PPE ensembles designated for use during work tasks have been selected to provide protection against contaminants at known or anticipated concentrations in soil or water. However, no protective garment, glove, or boot is chemical-proof, nor will it afford protection against all chemical types. Permeation of a given chemical through PPE is a complex process governed by contaminant concentrations environmental conditions, physical condition of the protective garment, and the resistance of a garment to a specific contaminant; chemical permeation may continue even if a garment is resistant to a specific contaminant; chemical permeation may continue even after the source of contamination has been removed from the garment.

In order to obtain optimum usage from PPE, the following procedures are to be followed by all site personnel using PPE:

- When using disposable coveralls, don a clean, new garment after each rest break or at the beginning of each shift.

- Inspect all clothing, gloves, and boots both prior to and during use for:
  - Imperfect seams
  - Non-uniform coatings
  - Tears
  - Poorly functioning closure

- Inspect reusable garments, boots, and gloves both prior to and during use for:
  - Visible signs of chemical permeation
  - Swelling
  - Discoloration
  - Stiffness
  - Brittleness
  - Cracks
  - Any sign of puncture
  - Any sign of abrasion

Reusable gloves, boots, or coveralls exhibiting any of the characteristics listed above will be discarded.

6.5 Donning of PPE

A routine will be established and followed at the site for donning the PPE. The procedures will be discussed in detail during the site safety meeting before starting the project and briefly during the periodic site safety meetings.

Before wearing any level of PPE, it will be checked to ensure that it is in proper condition for the purpose for which it is intended. Also, workers with any minor injuries and/or openings in the skin surface, such as cuts and scratches, will be attended to in order to protect such areas which may potentially enhance exposure effects. Workers with large cuts, rashes, or other such skin damage will not be allowed to don PPE.

After donning the equipment, its fit will be evaluated by the HSC before the worker is allowed to enter the Exclusion Zone (see section 8.2 for definition).

7.0 MEDICAL SURVEILLANCE

PWT has developed and implemented a medical surveillance program to comply with the requirements of 29 CFR 1910.120(f) and 29 CFR 1926.65. This program requires annual medical monitoring (including pulmonary function evaluation) for all PWT personnel working at this site who may be in contact with contaminated or potentially contaminated soil, groundwater, or other materials. Records for this program are kept in compliance with the requirements of 29 CFR 1910.120 and 29 CFR 1926.65. These records include: (1) the name and social security number of the employee; (2) physician's written opinions, recommended limitations, and results of examinations and tests; (3) any employee medical complaints related to exposure to hazardous substances; and (4) a copy of the information provided to the examining physician by the employer. The PWT Medical Surveillance Program is reproduced in Attachment G. Subcontractors/subcontractors will be required to have medical surveillance programs that comply with 1910.120(f) and 29 CFR 1926.65.

8.0 SITE CONTROL AND DECONTAMINATION

The site control and decontamination program is designed to accomplish two objectives. The first objective is to minimize the exposure of personnel to potentially hazardous substances and/or situations. The second objective is to minimize the transfer of potentially hazardous substances within and from the site. These objectives will be accomplished by the use of a buddy system, the establishment of work zones, the proper decontamination of personnel and equipment, and proper maintenance of safety equipment.

8.1 Safe Work Practices

The following general safe work practices will apply for each task involving field work at the site:

- A "buddy system" will be used for all field activities with buddies assigned prior to the initiation of each task. Each worker will be responsible for monitoring the location and condition of his buddy at all times while in the exclusion and contaminant reduction zones (see below) and will assist his buddy in PPE decontamination as needed.
- Personnel will not eat, chew gum or tobacco, smoke, take medicine or perform any other practice that increases the likelihood of hand to mouth transfer of potentially hazardous substances from gloves, unwashed hands or equipment when in the exclusion or contaminant reduction zones (see below).
- No one is to carry "strike-anywhere" matches or cigar/cigarette lighters.
- Personnel will stand upwind of all intrusive activities involving disturbance of the ground surface (e.g., soil excavation) and groundwater sampling.
- Breaks will be offered to all site workers. A five-minute break per hour may be taken by any worker, although it is not mandatory. Breaks may be taken while in the exclusion zone; however no water will be available in the exclusion zone. Water may be consumed in the contaminant reduction zone.

Additional safe work practices applicable to the site are included in Attachment A.

8.2 Work Zones

For all field tasks performed during the site investigation, three zones will be defined at the site: the exclusion zone, the contaminant reduction zone and the support zone. These zones will be defined by the subcontractor. The exclusion zone is the area where contamination does or could occur. Unauthorized personnel and unnecessary equipment or vehicles will not be permitted in the exclusion zone while work is being performed. Access to the exclusion zone will be controlled by the HSC. The contaminant reduction zone (CRZ) is the transition area between the potentially contaminated area and the support zone. Decontamination operations (see Section 8.3 below) will be performed in the CRZ. The support zone is considered a non-contaminated or clean area. This zone will be defined as the area outside of the exclusion zone. Normal work clothes are permitted in this zone.

8.3 Decontamination and Safety Equipment Maintenance

At the completion of fieldwork, equipment used to drill, or handle residual subsurface materials will be decontaminated prior to leaving the site. An area at the site within the contaminant reduction zone will be used to establish a decontamination area. Water will be allowed to evaporate from the decontamination area, to the extent possible.

Decontamination and maintenance of personal protective equipment is required to ensure their proper functioning and level of protection. At a minimum, nitrile gloves and Tyvek® coveralls shall be replaced daily or after breaks; if they become damaged, they shall be replaced immediately.

Decontamination of personnel, PPE and small, hand-operated equipment will take place within the personnel decontamination area; stations in the area will be as follows:

Station 1: Remove disposable PPE such as coveralls, boot covers and gloves (if used); deposit in container (likely a heavy duty polyethylene garbage bag).

Station 2: Remove hardhat, safety glasses and/or respirator (if used); rinse if necessary with hand-held sprayer; place on table or in plastic tubs to dry. Inner gloves (if used) will be removed last and placed in trash bag.

Station 3: Rest/Break Area and Decontamination Area Exit.

This area will be utilized as a rest or break area. First aid supplies and water will be located in this area. Shade, fluid-replacement drinks and hot drinks may be provided in hot or cold weather.

The above outline is intended as a guideline for decontamination procedures. The decontamination areas will be established prior to initiation of field activities, and the exact decontamination procedures will be established at that time based on field conditions, space considerations, etc. In addition, the above decontamination procedures apply only to activities where modified Level D or Level C PPE is required. For other activities, a less rigorous decontamination procedure may be practiced, consisting of a thorough scrubbing of boots and removal and disposal of PPE in proper containers, etc.

Following completion of site activities, decontamination equipment, Tyvek® coveralls, gloves, plastic sheeting and other disposable items will be placed in large plastic bags and disposed of per approved procedures. Water from decontamination operations will be contained on-site. No organic solvents will be used for site decontamination operations.

8.4 Sanitation

An adequate supply of potable water will be provided for all site workers in portable containers placed in the support zone. Single service cups and a receptacle for used cups will be provided adjacent to the water container. Washing facilities will be provided in the CRZ. A portable toilet may be located within the support zone.

9.0 EMERGENCY RESPONSE PLAN

The required elements of an emergency response plan as specified in 29 CFR 1910.120(1) and 29 CFR 1926.65 are listed below. A map showing the location of the VB/I70 Site and the nearest hospital is provided in Figures 3 and 4.

As described in the regulation, many of these items primarily pertain to emergency responses at uncontrolled hazardous waste sites, and thus are not entirely applicable to the tasks of the site removal, which do not constitute an emergency response situation. The subcontractor will be responsible for providing emergency response plans for their activities. An explanation of how each plan element will be implemented at the site is provided below:

1) Pre-emergency planning - This emergency response plan will be provided to all (including Removal Subcontractor personnel) working on the site during the pre-entry briefing. In addition, emergency response actions will be reviewed with all personnel during the pre-entry briefing and the tailgate safety meetings.

2) Personnel roles, lines of authority, and communication - The HSC will be responsible for emergency coordination at all times. Any accidents and/or injuries shall immediately be reported to him.

3) Emergency recognition and prevention - Physical and chemical hazards at the site will be reviewed at the pre-entry briefing and the tailgate safety meetings.

4) Safe distances and places of refuge - Should emergency conditions arise requiring site evacuation, the HSC will notify all on-site personnel immediately through the use of hand signals and an air horn. The HSC will notify all on-site personnel through the use of hand signals and an air horn in the event that operations should be immediately stopped but the site may not require evacuation.

5) Site security and control - During performance of field activities, site control will also be provided through the designation of work zones for each activity.

6) Evacuation routes and procedures - The HSC will notify all on-site personnel of the need for immediate evacuation. Site evacuation will be performed in an orderly fashion under the direction of the HSC. All field equipment, except for personal air monitoring instruments, will be left on-site. In case of a site evacuation due to airborne contaminant levels that exceed worker protection levels, personal air monitoring instruments will be used to determine when the site is safe to reenter.

7) Emergency decontamination procedures - In the event of a medical emergency, personnel decontamination prior to medical treatment may be omitted. Whenever possible, PWT personnel will accompany contaminated victims to the hospital to provide advice on matters involving decontamination. If on-site first aid is rendered and the victim does not require transport to the hospital, clothing and equipment decontamination as described in Section 8.3 will be performed after first aid measures have been performed.

8) Emergency medical treatment and first aid - Based on the severity of the injury/exposure, additional medical treatment will be obtained as described below.

9) Emergency alerting and response procedures - The procedures listed below will be used in the event of any site emergency:

a) Assess the situation to insure personal safety is not compromised before rendering aid to anyone.

b) If a serious injury or life-threatening conditions exists, dial 911 from the nearest phone so that appropriate response teams may be dispatched. Directions to the hospital are provided on Figure 3.

c) Remove any injured person(s) from immediate danger and administer first aid as needed.

d) Notify HSC before resuming work.

10) Reporting procedure – All accidents or injuries must be reported to HSC.

a) HSC will post OSHA 300 logs on site.

b) Supervisors and Subcontractors contacts will report all accidents or injuries to the HSC.

c) HSC will log and report all accidents or injuries on OSHA 300 logs.

11) Critique of response and follow-up - Following any site emergency, the HSC will prepare a written report for review by the PWT Corporate Health and Safety Officer and the subcontractor contacts. In addition, any accidents or emergency incidents shall be reported to the relevant local, state and federal agencies by the HSC as appropriate. The report will include a summary of the emergency, a description of the conditions that led to the emergency, a review of the response actions implemented following the emergency and a discussion of steps that might have been taken to prevent a recurrence of the emergency. Following review of this report, the PWT Corporate Health and Safety Officer will meet with the HSC to discuss the emergency, the response to the emergency and possible changes to the Site Safety and Health or Emergency Response Plans.

10.0 REFERENCES

Engineering Management Support, Inc. 2009. *Remedial Investigation Report for the Vasquez Boulevard/Interstate 70 Superfund Site Operable Unit 02 – On-Facility Soils Former Omaha and Grant Smelter. December 16, 2009.*

USEPA 2007. *Final Remedial Investigation Report for the Vasquez-Boulevard and I-70 Superfund Site Operable Unit 03 (Argo Smelter) Denver, Colorado. September 2007.*

ATTACHMENTS

ATTACHMENT A

JOB SAFETY ANALYSIS

Job Safety Analysis

Control No: NA	Status: NA	Original Date: 3/8/2007 Last Date Closed: 10/25/2011

Organization: PWT
JSA Type:
Work Type: Borehole drilling: Auger/Direct-Push,well installation and sampling
Work Activity: **Install and develop groundwater monitoring wells; manage IDW.**

Personal Protective Equipment (PPE)	Selected	Comments
Steel-Toed Work Boots	X	
Hard Hat	X	
Safety Glasses With Side Shields	X	When Drilling
Fire Resistant Clothing		
Face Shields		
Goggles	X	When driller is decontaminating augers/core barrels/drill string
Lifeline/Body Harness		
Hearing Protection	X	During drilling activities.
Air Purifying Respirator		
Supplied Air Respirator – SCBA		
Welding Hood		
Welding/Pipe Clothing		
Welding Mask/Goggles		
Personal Floatation Device		
Gloves	X	Nitrile or similar for potentially contaminated material. Heavy duty work gloves for material handling.
Other		
Safety Cones/Barricades	X	To control/alert traffic and exclude unauthorized personnel
Safety Vest	X	At all times.
Knee Pads		
Caution Tape	X	As needed, to exclude unauthorized personnel
Back Belt/Support		

Reviewers

Reviewer Name/Signature	Position	Date Approved
	H&S Reviewer	
Steve Singer	PWT Project Manager	

Project Team Member Name/Signature	Position	Date Approved
Stephen Singer	Field Manager	

Job Steps

No	Job Steps	Potential Hazard	Critical Actions
1	Mobilize to work site	Traffic accident.	Vehicle Operation (valid drivers license, seat belt use, routine vehicle inspections, headlights on while driving). No cellular phone use while driving.

2	Rig set-up	Being struck by vehicles.	Traffic control by traffic cones, barricade tape, and/or sawhorse barricades as required by Traffic Control Plan. Vests for personnel near traffic. Vehicle(s) placed between workers and oncoming traffic. Rig equipped with functional back-up alarm.
		Contact with overhead structures or utilities.	FM will visually inspect location and ensure absence of obstructions and overhead utilities prior to rig set-up. Rig components will not be allowed to come within 10 feet of overhead power lines.
		Temperature stress.	If temperature is above 80°F or below 40°F, administrative controls will be implemented (cooled or warmed drinks, routine breaks in shaded or heated area, provisions for emergency cooling or heating).
		Severe Storms	If lightning is seen or thunder heard, work shall stop. FM or designate shall estimate distance of storm from site. If storm is within 3 to 5 miles of site (as determined by elapsed time between lightning and thunder, with 30 seconds from lightning flash to thunder sound as measurement criteria, stand away from rig and lower mast if possible until conditions improve.
		Lifting/Manual handling hazards.	Lifts of over 50 pounds will require team lifting or mechanical assistance. Lift with legs, keeping back vertical. Keep loads near body.

3	Drilling and addition/ manipulation of drill string	Being struck by vehicles.	Traffic controls as in step 2.
		Temperature extremes	Temperature stress controls as in step 2.
		Severe Storms	If lightning is present, stand away from rig and lower mast if possible.
		Lifting/Manual handling	Lifting controls as in step 2.
		Rotating and/or moving equipment.	Only experienced operators will operate drill rig. Rigs will be operated per subcontractor's standard procedures or per manufacturer's directions. Rigs will have two functional kill switches or "dead-man" control. FM will confirm that switches work at beginning of field work.
		Falling equipment.	No workers under suspended loads. Exclusion zone around rig.
		Subsurface utilities (electric shock, fire, damage to utilities)	FM will ensure that each boring location has been cleared through the Utility Notification Center of Colorado, to preclude contact with buried utilities.
		Noise	Hearing protection during drilling activities unless equipment-specific monitoring indicates that noise levels are less than 85 decibels.
		Fire	Fire extinguisher rated 2A and 5B (serviced annually and inspected monthly) in all fuel use areas.
		Chemical exposure	Nitrile gloves for chemical/contaminant. Medical clearance for hazardous waste work. Wash hands before eating or drinking. Chemical containers labeled with identity and hazard. MSDSs on site for all chemicals in use. Site-specific training must address chemicals, hazards, and proper handling
4	Well construction or borehole abandonment	Being struck by vehicles.	Traffic control as in step 2.
		Temperature extremes	Temperature stress controls as in step 2.
		Lifting/Manual handling	Lifting controls as in step 2.
		Fire	Fire controls as in step 3.
		Chemical exposure	Chemical exposure control as in step 3.
		Particulate exposure	Visually monitor for dust and take action (wetting, etc.) to suppress if dust is visible in breathing zone.

5	Containing and managing soil cuttings, decon fluids, purge water and other IDW	General safety hazards (lifting equipment, manual lifting, slips, pinch points)	Equipment will be operated per subcontractor's standard procedures or per manufacturer's directions. Unnecessary personnel will stay well clear of operating equipment. Functional back-up alarm for trucks, bobcats, etc. Documented forklift training for forklift operators and daily forklift inspections. Only experienced operators will be allowed to operate equipment. No personnel under lifted loads. Drum dollies used to move drums on flat surfaces. Lifting controls as in step 2.
		Temperature extremes	Temperature stress controls as in step 2. Lifting controls as in step 2.
		IDW control	Label or mark IDW containers to indicate container number, contents (including physical state), investigation location, date of collection, and client name. Ensure that storage area provides adequate protection against physical damage, disturbance, or tampering.
		Chemical exposure	Medical clearance for hazardous waste work. Nitrile gloves for chemical/contaminant contact. Wash hands before eating or drinking.

Reviewers		
Name/Signature	Position	Date
Steve Singer	PWT Project Manager	
	H&S Reviewer	
	Field Manager	
Field Verification and Validation — Name/Signature		
Comments:		

Job Safety Analysis

Control No: NA	Status: NA	Original Date: 3/7/2007 Last Date Closed: 10/25/2011

Organization: PWT
JSA Type:
Work Type:
Work Activity: **Groundwater and Surface Water monitoring and sampling**

Personal Protective Equipment (PPE)	Selected	Comments
Steel-Toed Work Boots	X	
Hard Hat	X	
Safety Glasses With Side Shields	X	
Fire Resistant Clothing		
Face Shields		
Goggles		
Lifeline/Body Harness		
Hearing Protection		
Air Purifying Respirator		
Supplied Air Respirator – SCBA		
Welding Hood		
Welding/Pipe Clothing		
Welding Mask/Goggles		
Personal Floatation Device		
Gloves	X	Nitrile or similar for potentially contaminated material. Heavy duty work gloves for material handling.
Other		
Safety Cones/Barricades	X	To control/alert traffic and exclude unauthorized personnel
Safety Vest	X	
Knee Pads		
Caution Tape		As needed, to exclude unauthorized personnel
Back Belt/Support		

Reviewers

Reviewer Name/Signature	Position	Date Approved
	H&S Reviewer	
Steve Singer	PWT Project Manager	

Project Team Member Name/Signature	Position	Date Approved
Stephen Singer	Field Manager	

Job Steps

No	Job Steps	Potential Hazard	Critical Actions
1	Mobilize to work site	Traffic accident.	Vehicle Operation (valid driver's license, seat belt use, routine vehicle inspections, headlights on while driving).

2	Groundwater monitoring and sampling	Being struck by vehicles.	Traffic control by traffic cones, barricade tape, and/or sawhorse barricades. Vehicle(s) placed between workers and oncoming traffic.
		Temperature stress.	If temperature is above 80°F or below 40°F, administrative controls will be implemented (cooled or warmed drinks, routine breaks),shaded or heated area, provisions for emergency cooling or heating).
		Fire	Fire extinguisher (serviced annually and inspected monthly, inspection tag present) in all fuel use areas.
		Chemical exposure	Breathing zone monitoring with 10.2 eV PID, explosimeter and O^2 monitors if free product is anticipated. Stop work if breathing zone readings exceed 5 ppm for more than 1 minute. Nitrile gloves for chemical/contaminant contact. Medical clearance for hazardous waste work. Wash hands before eating or drinking. Chemical containers labeled with identity and hazard. MSDSs on site for all chemicals in use. Site-specific safety briefing must address chemicals, hazards, and proper handling. 15-minute eyewash must be within 100 feet if pouring corrosives. Eyewash bottle must be within 10 feet if adding water samples to pre-preserved containers.
		IDW control	Label or mark IDW containers to indicate container number, contents (including physical state), investigation location, date of collection, and client name. Ensure that storage area provides adequate protection against physical damage or disturbance.
		Slips, Trips and Falls	Before sampling surface water from a ditch or the Platte River, establish good footing so that the possibility of slipping is mitigated. If necessary, use an extended pole to reach downward to the water surface. Do not lean or bend over the water to a point where slipping dangers are increased.

Reviewers		
Name	Position	Date
	PWT Project Manager	
	H&S Reviewer	
	Field Manager	
Field Verification and Validation	Name/Signature	

Job Safety Analysis

Control No: NA	Status: NA	Original Date: 1/15/2003 Last Date Closed: 1/15/2003

Organization: PWT
JSA Type:
Work Type:
Work Activity: **Equipment decontamination**

Personal Protective Equipment (PPE)	Selected	Comments
Steel-Toed Work Boots	X	
Hard Hat	X	
Safety Glasses With Side Shields	X	
Fire Resistant Clothing		
Face Shields	X	Worn over safety glasses if using power sprayer.
Goggles		
Lifeline/Body Harness		
Hearing Protection		
Air Purifying Respirator		
Supplied Air Respirator – SCBA		
Welding Hood		
Welding/Pipe Clothing		
Welding Mask/Goggles		
Personal Floatation Device		
Gloves	X	Nitrile or similar for potentially contaminated material. Heavy duty work gloves for material handling.
Other	X	Rubberized apron when decontaminating augers
Safety Cones/Barricades	X	As necessary, to control/alert traffic and exclude unauthorized personnel. See traffic control plan.
Safety Vest	X	
Knee Pads		
Caution Tape	X	As needed, to exclude unauthorized personnel
Back Belt/Support		

Reviewers

Reviewer Name	Position	Date Approved
	H&S Reviewer	
Steve Singer	PWT Project Manager	

Project Team Member Name/Signature	Position	Date Approved
Stephen Singer	Field Manager	

Job Steps

No	Job Steps	Potential Hazard	Critical Actions

1	Mobilize to work site	Traffic accident.	Compliance with EEMS EC&HS Procedure 110, Vehicle Operation (valid drivers license, seat belt use, routine vehicle inspections, headlights on while driving).
2	Equipment decontamination by washing and water rinse	Being struck by vehicles.	As necessary, traffic control by traffic cones, barricade tape, and/or sawhorse barricades. Vehicle(s) placed between workers and oncoming traffic.
		Temperature stress.	If temperature is above 80°F or below 40°F, administrative controls will be implemented (cooled or warmed drinks, routine breaks in shaded or heated area, provisions for emergency cooling or heating).
		Electric shock.	Portable electrical tools and all portable electrical equipment that poses a shock hazard must be connected through ground fault circuit interrupters.
		Fire	Fire extinguisher rated 2A and 5B (serviced annually and inspected monthly) in all fuel use areas.
		Chemical exposure	Medical clearance for hazardous waste work. Wash hands when exiting exclusion zone. Nitrile gloves for chemical/contaminant contact. Chemical containers labeled with identity and hazard. MSDSs on site for all chemicals in use. Site-specific training must address chemicals, hazards, and proper handling. Place lids on drums when not in use.
		IDW control	Label or mark IDW containers to indicate container number, contents (including physical state), investigation location, date of collection, and client name. Ensure that storage area provides adequate protection against physical damage or disturbance.

Recycle Comments		
Name	Date	Comments
Quality Reviews		
Field Verification and Validation		

Job Safety Analysis

Control No: NA	Status: NA	Original Date: 3/7/2007 Last Date Closed:

Organization: PWT
JSA Type:
Work Type:
Work Activity: **Land Surveying**

Personal Protective Equipment (PPE)	Selected	Comments
Steel-toed Work Boots	X	
Hard Hat	X	
Safety Glasses With Side Shields	X	
Fire Resistant Clothing		
Face Shields		
Goggles		
Lifeline/Body Harness		
Hearing Protection		
Air Purifying Respirator		
Supplied Air Respirator – SCBA		
Welding Hood		
Welding/Pipe Clothing		
Welding Mask/Goggles		
Personal Floatation Device		
Gloves		Nitrile or similar for potentially contaminated material. Heavy duty work gloves for material handling.
Other		
Safety Cones/Barricades	X	To control/alert traffic and exclude unauthorized personnel if required by Traffic Plan
Safety Vest	X	
Knee Pads		
Caution Tape	X	As needed, to exclude unauthorized personnel
Back Belt/Support		

Reviewers

Reviewer Name/Signature	Position	Date Approved
	H&S Reviewer	
Steve Singer	PWT Project Manager	

Project Team Member Name/Signature	Position	Date Approved
	Field Manager	

No	Job Steps	Potential Hazard	Critical Actions
1	Mobilize to work site	Traffic accident.	Vehicle Operation (valid drivers license, seat belt use, routine vehicle inspections, headlights on will driving).
2	Groundwater monitoring and sampling	Being struck by vehicles.	Traffic control by traffic cones, barricade tape, and/or sawhorse barricades. Vehicle(s) placed between workers and oncoming traffic.
		Temperature stress.	If temperature is above 80°F or below 40°F, administrative controls will be implemented (cooled or warmed drinks, routine breaks),shaded or heated area, provisions for emergency cooling or heating).
		Fire	Fire extinguisher (serviced annually and inspected monthly) in all fuel use areas.
		Chemical exposure	Breathing zone monitoring with 10.2 eV PID if free product is anticipated. Stop work if breathing zone readings exceed 5 ppm for more than 1 minute. Nitrile gloves for chemical/contaminant contact. Medical clearance for hazardous waste work. Wash hands before eating or drinking. Chemical containers labeled with identity and hazard. MSDSs on site for all chemicals in use. Site-specific safety briefing must address chemicals, hazards, and proper handling. 15-minute eyewash must be within 100 feet if pouring corrosives. Eyewash bottle must be within 10 feet if adding water samples to pre-preserved containers.
		IDW control Shipping hazardous materials	Label or mark IDW containers to indicate container number, contents (including physical state), investigation location, date of collection, and client name. Ensure that storage area provides adequate protection against physical damage or disturbance.

Reviewers			
Name		Position	Date
Steve Singer		PWT Project Manager	
		H&S Reviewer	
		Field Manager	
Field Verification and Validation	Name/Signature		

ATTACHMENT B

PLAN ADDENDA

THIS SECTION IS INTENTIONALLY BLANK AND IS RESERVED

FOR ADDITIONAL ADDENDA TO THIS PLAN

ATTACHMENT C

SAFETY COMPLIANCE AGREEMENTS

SAFETY COMPLIANCE AGREEMENT

Pacific Western Technologies, Ltd.

PROJECT No.: 123/125-RICO-089R

PROJECT TITLE: Vasquez Blvd./I70 Superfund Site Remedial Investigations

PROJECT TASK: _____

_____

I, _____, (print name) have received a copy of the Site Health and Safety Plan (HASP) for the above referenced project. I have read the HASP and agree to comply with all the health and safety requirements contained therein. I understand that I may be prohibited from working on the project for violating any of the Plan requirements.

SIGNATURE: _____ DATE: _____

NOTE: This form must be submitted to the PWT Project Manager.

SUBCONTRACTOR SAFETY COMPLIANCE AGREEMENT

Pacific Western Technologies, Ltd.
Subcontractor Form

PROJECT No.: 123/125-RICO-089R

PROJECT TITLE: Vasquez Blvd./I70 Superfund Site Remedial Investigations

PROJECT TASK: _____

_____

The Pacific Western Technologies, Ltd. (PWT) Site Health and Safety Plan (HASP) provides guidance for site-specific safety requirements. It is not intended to replace any general or specific requirements of a subcontractor's safety program. PWT personnel will, to the best of their ability, inform subcontractors of any potential hazard(s) that has been identified during the field investigations. However, subcontractors will bear the ultimate responsibility for all matters dealing with health and safety in the performance of their appointed work. This responsibility will include, at a minimum, ensuring that their equipment is in proper working order and that their employees and/or authorized representatives are trained and medically fit in accordance with OSHA Standards 29 CFR 1910 and 29 CFR 1926, as appropriate. The subcontractor is also responsible for informing its' subcontractors of these requirements.

I, _____, (print name) have received a copy of the HASP for the above referenced project. I have read the Plan and agree to comply with all the health and safety requirements contained therein. I understand that I may be prohibited from working on the project for violating any of the Plan requirements.

SIGNATURE: _____ DATE: _____

AFFILIATION: _____

NOTE: This form must be submitted to the PWT Project Manager.

ATTACHMENT D

MATERIAL SAFETY DATA SHEETS

ATTACHMENT E

SAFETY MEETING ATTENDANCE FORMS

SAFETY MEETING ATTENDANCE FORM

Pacific Western Technologies, Ltd.

PROJECT No.: 123/125-RICO-089R

PROJECT TITLE: Vasquez Blvd./I70 Superfund Site Remedial Investigations

PROJECT TASK: _____

_____

SIGNATURE	AFFILIATION

TOPICS COVERED (Check all that apply):

_____ Tasks to be performed
_____ Personal Protective Equipment
_____ Air and Personnel Monitoring
_____ Hazard Recognition
_____ Decontamination
_____ Site Control

PWT RE/HSC: _____

SIGNATURE: _____ DATE: _____

ATTACHMENT F

PWT PERSONAL PROTECTIVE EQUIPMENT/RESPIRATORY PROTECTION PROGRAM

PWT PERSONAL PROTECTIVE EQUIPMENT PROGRAM/ RESPIRATORY PROTECTION PROGRAM

PWT has developed and implemented a personal protective equipment (PPE) program to comply with the requirements of 29 CFR 1910,120 (g)(5). This PPE program contains procedures for:

1. PPE use and limitations;
2. PPE maintenance and storage;
3. PPE decontamination and disposal;
4. PPE training and proper fitting;
5. PPE donning and doffing;
6. PPE inspection prior to, during, and after use;
7. Evaluation of the PPE program effectiveness; and'
8. Limitations during temperature extremes and heat stress, and other appropriate medical considerations.

The PPE program also includes a respiratory protection program (RPP) to comply with 29 CFR 1910.134.

The purpose of PPE is to shield individuals from safety and/or health hazards that may be encountered while performing site work. Careful selection, training, use and maintenance of PPE are necessary to minimize the risk to individuals while they are performing work in potentially hazardous environments. The type of PPE to be worn by PWT employees will be evaluated by the degree of exposure to a potential hazard on a site-to-site basis. Specific PPE use will be outlined in the Site Health and Safety Plan (Section 3.0).

The minimum PPE to be worn by PWT employees at most sites will consist of head, eye, foot and, in some cases, hearing protection. On sites where there is a potential for exposure to specific physical hazards or to health hazards other than physical hazards, PWT employees may be required to wear protective clothing and/or respiratory protective devices. The Site Health and Safety Plan will outline the levels of protection required of each individual for each task to be performed. The PWT Site Safety Officer will be responsible for determining when conditions warrant upgrading or downgrading the level of protection. The Site Health and Safety Plan will also outline PPE decontamination and disposal procedures, PPE donning and doffing procedures, limitations during temperature extremes and heat stress, etc.

Training in the proper use and limitation, maintenance and storage, fitting, donning and doffing, etc., of PPE will be initially received by employees in an OSHA off-site hazardous materials health and safety course (i.e., 40-hr course). At a minimum, these skills will be maintained by attendance of annual refresher courses. Supplemental training may be provided by qualified PWT personnel, outside contractors, vendors, etc., on an as needed basis. It is the employee's responsibility to read and become familiar with the manufacturer's instructions concerning, but not limited to, the use, limitation, care, storage, etc., of all PPE.

The PPE program will typically be evaluated on an annual basis. Training and/or literature obtained by PWT personnel will be used to revise and update the procedures, provisions, etc., presented in the following sections. In addition, information, experience, etc., obtained during projects, or knowledge of new techniques, may be used to revise the PPE program at any time.

The following sections briefly describe the use of head, eye, foot, hearing, and respiratory protective equipment. In addition, the use of chemically resistant clothing is also addressed. Infrequently, employee may be required to use PPE not addressed in these sections for a specific project-related task. On such occasions, the procedures for the use and limitation, maintenance and storage, decontamination and disposal, training and proper fitting, donning and doffing, inspection, evaluation of effectiveness, and medical considerations will be contained in the Site Health and Safety Plan (Section 3.0).

1.1 Head Protection

The use of helmets (hard hats) for the protection of heads from impact and penetration from falling and flying objects is specified under 29 CFR 1910.135. In general, PWT employees will be required to wear hard hats when the potential exists for a threat from an overhead object. In many cases, mandatory use of hard hats is required by clients while performing work at any location on their facility.

As specified in 29 CFR 1910.135, PWT will supply employees with head protection that meets the requirements of the American National Standards Institute (ANSI) Standard Z89.1 (Requirements for Industrial Head Protection).

The hard hats will be used, cleaned; maintained, etc., by the employee per the manufacturer's instructions. Employees will inspect hard hats prior to each use to ensure that the hat is in proper condition. Use of head protection with structural damage, or alterations that may compromise the structural integrity of the hard hat, is prohibited. If defects are detected, the hat will be exchanged. Any alterations to the hat such as, but not limited to, drilling of holes, painting, or cleaning with solvents and/or thinners, or modifications to the suspension can compromise the structural integrity of the hat.

1.2 Eye and Face Protection

The use of protective eye and/or face equipment is specified under 29 CFR 1910.133. PWT employees will be required to wear eye protection on all job sites. The type of protection required will be a function of the potential threat and will be specified in the Site Health and Safety Plan (Section 3.0). In general, safety glasses with permanently attached side shields will be required when the principal threat is physical (e.g., flying objects). When the potential for splash exists, goggles or face shields may be required.

PWT will supply employees with safety glasses, goggles, and/or face shields that meet the requirements of ANSI Standard Z87.1 (Occupational and Educational Eye and Face Protection). For employees who require the use of corrective lenses, PWT will reimburse those individuals for the purchase of one pair of glasses that comply with the above ANSI Standard. The eye glasses must have permanently attached side shields.

Face and eye protection will be used; cleaned, maintained, etc., by the employee per the manufacturer's instructions. Employees will inspect eye and/or face protection prior to each use to ensure that it is in proper condition. Use of eye and face protective equipment with structural or optical defects is prohibited. If defects are detected, the eye or face protection will be exchanged.

1.3 Foot Protection

The use of foot protection (i.e., steel-toe boots) is specified under 29 CFR 1910.136. PWT employees will be required to wear foot protection on all job sites. The construction of the foot protection (e.g., leather, PVC, etc.) will be a function of the potential threat and will be specified n the Site Health and Safety Plan (Section 3.0).

PWT employees will generally be responsible for the purchase of their own foot protection. PWT will reimburse employees for the purchase of one pair of leather boots and one pair of waterproof (e.g., PVC) boots. On projects that necessitate the purchase of footwear composed of specific chemical resistant materials, PWT will supply personnel with the appropriate footwear.

Employees are responsible for ascertaining that the footwear they purchase complies with the requirements of the ANSI Standard Z41.1 (Men's Safety-Toe Footwear). The footwear will be used, cleaned, maintained, etc., by the employee per the manufacturer's instructions. Employees will inspect foot protection prior to each use to ensure that it is in proper condition. Use of footwear with structural defects, worn soles, cracks, etc., is prohibited. If defects are detected, the boots will be exchanged.

1.4 Hearing Protection

Exposure to high noise levels can cause hearing loss or impairment. There is no cure for noise-induced hearing loss, so the prevention of excessive noise exposure is the only way to avoid hearing damage. Protection against the effects of occupational noise exposure is specified in 29 CFR 1910.95. This OSHA standard sets an 8-hour time-weighted-average (TWA) sound exposure level of 90 decibels (dBA); the 8-hour TWA action level is set at 85 dBA.

PWT does not routinely monitor noise levels at job sites. However, it is PWT's policy that hearing protection be used whenever the potential exists for exposure to excessive noise levels. As such, it is the responsibility of the employee to use company-supplied hearing protection whenever project work is performed adjacent to any operating machinery, etc., or the project involves the use of any equipment, tools, etc., no matter how long the duration. The following data, extracted from "Fundamentals of Industrial Hygiene I (Table 9-B), are provided as examples of noise levels generated by common activities/equipment: average residence - 40 dBA; noisy office - 80 dBA; passing truck - 100 dBA; turbo jet engine - 150 dBA.

Disposable earplugs will be used one time, per the manufacturer's instruction, and then discarded. Non-disposable hearing protection will be used, cleaned, maintained, etc., by the employee per the manufacturer's instructions. Employees will inspect hearing protection prior to each use to ensure that it is in proper condition. Use of hearing protection with structural or acoustical damage is prohibited. If defects are detected, the hearing protection will be exchanged.

1.5 Chemically Resistant Clothing

Protective clothing prevents potentially dangerous chemicals from entering the body, usually through the skin. Such clothing also protects the body from burns and cold or wet conditions. Protective clothing can range from gloves to fully encapsulated suits. The chief characteristics of chemical protective clothing include:

1. Strength;
2. Flexibility;
3. Thermal limits; and
4. Chemical resistance

Strength depends on the material's tensile strength and its resistance to abrasions; punctures, and tears. Flexibility allows the individual to move and work effectively. Gloves especially must be flexible, and in cold weather this is sometimes, a problem. Thermal limits refer to the material's ability to maintain its protective capacity in temperature extremes. Thermal limits also affect worker mobility in cold weather and heat transfer in hot weather.

Chemical resistance refers to a material's ability to retain its structural integrity and protective qualities. Material can degrade when a contaminant or chemical reacts with the material. All material eventually degrades. Swelling, shrinking, brittleness, softness, discoloration, elongation or cracking indicates deterioration. These conditions should alert the worker to the possibility that the material is not providing adequate protection.

Chemical resistance can also be described in terms of:

1. Degradation;
2. Breakthrough time;
3. Penetration; and
4. Permeation.

Degradation is the change of the material's physical properties as a result of the chemical's negative effects. Breakthrough time is the time it takes the chemical to pass through the protective material until it is first detected by an analytical instrument. Penetration refers to bulk chemical flow through the protective material. Penetration is not a material property but rather a function of garment design and construction.

Penetration can occur through:

1. Material defects;
2. Seams;
3. Sleeves;
4. Pant legs;
5. Zippers, button holes or other enclosures;
6. Neck or head openings; and

7. Porous material.

Aerosol particulates, mists, gas, and vapors have the greatest penetration ability. Penetration can be prevented by:

1. Stitched and lapped or sealed areas;
2. Self-sealing zipper and overlap flap;
3. Hood with elastic sealed connection;
4. Elastic wrists and ankles;
5. One-piece suit; and
6. Taping seams and openings such as ankles, wrists, and zippers.

The significance of penetration depends on skin absorptivity and the following contaminant characteristics:

1. Toxicity;
2. Concentration;
3. Physical phase; and
4. Exposure route.

Use of a garment constructed of an impenetrable material can cause the possibility of heat stress because outside air is not allowed to penetrate the material; thus, little air moves within the garment. Cooling devices (e.g., ice vests) are not always effective or efficient.

Permeation (i.e., chemical movement at the molecular level through the material) occurs once the chemical has broken through the material. Because movement is by molecular diffusion, movement is microscopic and unnoticeable by the unaided eye. The contaminant, which can condense inside the material, will tend to reach an equilibrium concentration gradient.

Permeation rate, the rate of chemical movement through the material once breakthrough has started, can be very fast or very slow. Permeation rate is:

1. Inversely proportional to material thickness (discounting fillers);
2. Directly proportional to contaminant concentration gradient; and
3. Directly proportional to the amount of direct contact with the contaminant.

Chemical resistance of the protective materials is based on laboratory degradation or permeation tests. Laboratories perform these tests at room temperature; higher temperatures may decrease permeation time and rate. These data are approximate values because manufacturers= products, even products made of the same material, can have different properties. In addition, considerations should be given to the following facts:

- Eventually all chemicals pass or permeate through protective materials, and this can happen without any visible indications;
- A material may protect a worker well against one chemical but poorly against another; no single material is an absolute barrier against all chemicals;

- Garments 'that look alike do not necessarily possess identical protective qualities; and
- When a material starts to absorb a chemical, the chemical will continue to permeate through the material even though the material may not be in direct contact with the chemical.

Specific considerations for glove, suit and boot selection include the following:

- Hands will probably come in contact with the greatest variety of contaminants;
- Gloves generally need to withstand longer exposure times;
- Gloves need to be flexible because intricate work is usually done with the hands;
- Inexpensive disposable suits can be worn over fully encapsulated suits to reduce contamination of the underlying suit;
- Garments that workers do not dispose of must be decontaminated;
- Boots must withstand long exposure times; especially if workers must stand in liquid; and
- Physical and psychological stress caused by the garment, especially the fully encapsulated suits, which can cause the wearer claustrophobia.

Chemical protective clothing will be required whenever the potential exists for exposure to hazardous concentrations of aqueous, solid, particulate and/or gaseous contaminants. In many instances, chemically protective clothing will be used in conjunction with respiratory protective devices (Section 4.6). Used together, combinations of these PPE will offer different levels of protection (i.e., Levels A, B, C, and D). The appropriate level of protection selected will be a function of the potential concentrations of the contaminant(s), the forms in which they are present, the route(s) of potential exposure (i.e., inhalation, skin absorption, ingestion, eye or skin contact, etc:), and the employee's work requirements and task-specific conditions.

The Site Health and Safety Plan will outline the levels of protection required of each individual for each task to be performed. The levels of protection will be assessed using site-specific chemical and physical data. The selection of PPE will be performed using guidelines in documents such as "Personal Protective Equipment for Hazardous Materials Incidents: A Selection Guide' and "Guideline's for the Selection of Chemical Protective Clothing 3. The PWT Site Safety Officer will be responsible for determining when conditions warrant upgrading or downgrading the level of protection. This determination will be made on the basis of "action levels" established in the Site Health and Safety Plan.

The Site Health and Safety Plan will also outline decontamination and disposal procedures, donning and doffing procedures, etc., for chemically protective clothing. Employees will inspect protective clothing prior to use to ensure that it is in proper condition. Use of protective clothing with structural defects is prohibited. If defects are detected, the protective clothing will be exchanged. In general, gloves, outer boots, and disposable coveralls will be replaced daily. If they become damaged, they will be replaced immediately.

1.6 Respiratory Protection

The use of respiratory protection is specified under 29 CFR 1910.134. The primary objective of this protection is to limit employee exposure to harmful atmospheric conditions. Potential exposure will be initially limited by engineering control measures, to the extent practical. When effective engineering controls are not feasible or effective, appropriate respiratory protection will be used.

PWT has developed the following Respiratory Protection Program (RPP) to comply with 29 CFR 1910.134(a)(2). It is the responsibility of the employee to use the provided respiratory protection in accordance with the instructions and training provided by the manufacturer, OSHA training courses, Site Health and Safety Plans, etc. The majority of this section is oriented to the selection, use, maintenance, etc. of air-purifying respirators (APRs), or Level C respiratory protection. Additional instruction, training, etc. for care and use of supplied air respiratory equipment (e.g., Levels A and B of respiratory protection) will be included in Site Health and Safety Plans, as appropriate, and incorporated into the RPP per the provisions described in Section 4.6.7.

1.6.1 Standard Operating Procedure for the Selection and Use of Respirators

The document "NIOSH Respirator Decision Logic 4, or equivalent; will be used as guidance for selecting appropriate levels of respiratory protection. Outside consultation, manufacturers assistance, and other recognized authorities may be consulted if there is any doubt regarding proper selection and use.

1.6.2 Respirator Selection

Respirators will be selected on the basis of hazards to which the worker may be potentially exposed. All selections will be made using site-specific chemical and physical data. The selection process will be documented in the Site Health and Safety Plan.

1.6.3 Instruction and Training

Employees will be instructed and trained in the proper use of respirators and their limitations. Training will provide the employee an opportunity to handle the respirator, have it properly fitted, test its face piece to face seal, wear it in normal air for a long familiarity period, and finally wear it in a test atmosphere. Employees will receive fitting instructions, including demonstrations and practice in how the respirator should be worn, how to adjust it, and how to determine if it fits properly.

Training' in the proper use and limitations, maintenance, and storage, fitting, donning, doffing, etc., of respirators will be initially received by employees in an OSHA off-site hazardous materials health and safety course. At a minimum, these skills will be maintained by attendance at an annual refresher course.

Respirators will not be worn when conditions prevent a good face seal. Such conditions may be growth of a beard, sideburns, a skull, cap that projects under the face piece, or temple pieces on glasses. No employees who are required to wear respirators may wear beards. Also, the absence of one or both dentures can seriously affect the fit of a face piece. To assure proper protection, it is the employee's responsibility to check the face piece fit each time the employee puts on the respirator. This will be done by following the manufacturer's face piece-fitting instructions.

Employees who may be required to wear respirators will be qualitatively fit-tested on an annual basis. However, under certain work situations, it may be necessary to perform quantitative fit testing. Fit testing documentation will be maintained in the corporate files.

1.6.4 Cleaning, Disinfection, and Storage

Where practicable, respirators will be assigned to individual employees for their exclusive use. Employees will be responsible for regularly cleaning and disinfecting their respirators. Respirators issued for the exclusive use of one employee will be cleaned after each use, or more often, if necessary. Respirators used by more than one employee will be thoroughly cleaned and disinfected after each use. Respirators will be cleaned and disinfected per the manufacturer's instructions.

Employees must store their respirators to protect against dust, sunlight, heat, extreme cold, excessive moisture, or damaging chemicals. Protection against mechanical damage will also be the responsibility of the employee. Respirators will be stored so that the face piece and exhalation valve will rest in a normal position to prevent the rubber or plastic from reforming in an abnormal shape.

1.6.5 Inspection

Employees will be responsible for the routine inspection of their respirators. Respirators will be inspected for wear and deterioration of their components before and after each use. Special attention will be given to rubber or plastic parts. The face piece, especially the face seal surface, headband, valves, connecting tube, fittings, and canister connections must be in good condition. At a minimum, respirators will be inspected during the annual fit test procedure (Section 4.6.3). If defects are detected, the respirator will be repaired/replaced. Inspection of the respirators will be documented. These inspection records will be maintained in the corporate files.

1.6.6 Surveillance

Appropriate surveillance of work area conditions (e.g., ambient air monitoring, personal monitoring, etc.) and degree of employee exposure or stress will be performed per the Site Health and Safety Plan.

1.6.7 Program Evaluation

Regular inspection and evaluation will be performed to assess the continued effectiveness of the RPP. The Corporate Health and Safety Officer may make periodic inspections of employee respirators to ensure compliance with the cleaning, disinfection, storage, inspection requirements outlined in Sections 4.6.4 and 4.6.5. In addition, the Site Safety Officer may make periodic audits of job sites to ensure compliance with the RPP. The program evaluations will be documented. These evaluation records will be maintained in the corporate files.

1.6.8 Medical Monitoring

Employees will not be assigned to tasks requiring use of respirators unless it has been determined that they are physically able to perform the work and use the equipment. The respirator user's medical status will be reviewed annually (Section 2.0).

1.6.9 Certification

Respirators will be NIOSH approved. Supplied air will meet or exceed Grade D breathing air specifications. A small, backup SCBA (escape pack) will be carried by personnel when using an SCBA or air-line respirator.

ATTACHMENT G

PWT MEDICAL SURVEILLANCE PROGRAM

PWT MEDICAL SURVEILLANCE PROGRAM

Employees who are or may be exposed to hazardous substances or health hazards at job sites at or above the established permissible exposure limits (PELs) will be included in a medical surveillance program in accordance with OSHA standard 29 CFR 1910.120 (0. The medical surveillance program will involve' medical examinations performed at the initiation of employment (baseline examination) and on an annual basis thereafter. Exceptions may be made where new employees have had a medical examination within six months that is equivalent to, or more stringent than, that required by PWT, provided the employee can provide proof of same. Additional examinations may be performed as conditions warrant. At the termination of employment, an exit physical will be performed. This exit physical may be waived if (1) the employee has had a full medical examination within the last six months; (2) it can be established that the employee has not been exposed to hazardous substances at or above the PELs since their full medical examination; and (3) the employee has not developed any symptoms associated with exposure to hazardous substances. If an employee voluntarily waives the right to an exit physical, they will be required to sign a statement to that effect.

PWT will provide for the cost of the medical surveillance. Results of the examinations will **be** provided to the employee, and will be maintained by the medical facilities performing the examinations for each of the PWT offices. The physician's written opinion will be maintained in the corporate files. Employee medical records will be identified by the name and social security number of the employee. Employee medical complaints related to exposure to hazardous substances will also be kept in these files. Employees will be given full access to their medical records during and after their employment in accordance with OSHA standard **29 CFR** 1910.20. These records will be maintained for at least the duration of employment plus 30 years.

The medical examinations will be performed by a licensed physician. The physician will be provided, at the time of examination, the following information:

- A copy of the federal OSHA standard 29 CFR 1910.120 (if not already in their possession);
- A description of the employee's duties as they relate to the employee's potential for exposure;
- The employee's exposure levels or anticipated exposure levels to hazardous substances;
- A description of any PPE used or to be used by the, employee; and
- Information from previous medical examinations of the employee that is not readily available to the examining physician.

The medical examinations will include medical and occupational history, with special emphasis on symptoms related to the handling of hazardous substances and to fitness for duty including the ability to wear required PPE. A panel of tests, designed to evaluate blood forming, kidney, liver and metabolic functions, will be performed. The basic medical examination will include:

- Complete medical and occupational history during the initial examination. Subsequent briefings will update the physician as to the employee's history since the previous examination; and
- Comprehensive physical, examination, including:
  - Audiogram;
  - Complete blood count (CBC) and chemistry profile;
  - Urinalysis, including dipstick and microscopic examinations;
  - Pulmonary function test, including forced expiratory Volume in one second (FEV1) and forced vital capacity (FVC); and
  - Electrocardiogram (EKG) (Baseline, every three years thereafter);
  - Chest X-Ray (baseline, every three years thereafter); and

- Supplemental tests to be performed at the discretion of the physician or if there is the likelihood of potential on-site exposure to a particular toxicant. These tests may include:
  - date immunization shots as needed (e.g., tetanus and diphtheria); and
  - Blood screening for specific heavy metals and/or organic compounds.

Following the medical examination, the physician will transmit a written report to PWT that will only contain the following:

- The physician's opinion as to whether the employee has any detected medical conditions which would place the employee at increased risk of material impairment of the employees health from work in hazardous waste operations;
- The physician's recommended limitations upon the employee's assigned work, including the ability to wear PPE (e.g., respiratory protection) under the various conditions expected at job sites; and
- A statement that the employee has been informed by the physician of the results of the medical examination and any medical conditions which require further examination or .medical treatment. Any subsequent testing or treatment may be the responsibility of the employee.

The physician's written report will be maintained in the corporate files. Specific results of the medical monitoring will be transmitted to the employee only.

ATTACHMENT H

Operable Unit 2
Previous Environmental Sampling Summary Statistics

Appendix F-1: Groundwater Sample Analytical Results from Prior Investigations

Sample ID	Matrix	Sampled	Method	Analyte	Result	Flag 1	Flag 2	Units
MW-2	GW	02-Nov-05	SW846 6020	Arsenic	0.15			mg/L
MW-2	GW	24-Jan-06	SW846 6020	Arsenic	0.13			mg/L
MW-2	GW	24-Jan-06	SW846 6020	Arsenic	0.12			mg/L
MW-2	GW	12-Apr-06	SW846 6020	Arsenic	0.1			mg/L
MW-2	GW	12-Apr-06	SW846 6020	Arsenic	0.11			mg/L
MW-2	GW	12-Jul-06	SW846 6020	Arsenic	0.12			mg/L
MW-2	GW	12-Jul-06	SW846 6020	Arsenic	0.12			mg/L
MW-2	GW	18-Aug-05	6010B	Cadmium	ND			mg/L
MW-2	GW	02-Nov-05	SW846 6020	Cadmium	0.00028	B		mg/L
MW-2	GW	02-Nov-05	SW846 6020	Cadmium	0.000086	B		mg/L
MW-2	WATER	24-Jan-06	SW846 6020	Cadmium	0.0001	B		mg/L
MW-2	GW	24-Jan-06	SW846 6020	Cadmium	0.0001	B		mg/L
MW-2	GW	24-Jan-06	SW846 6020	Cadmium	0.000088	B		mg/L
MW-2	GW	12-Apr-06	SW846 6020	Cadmium	0.00014	B		mg/L
MW-2	GW	12-Apr-06	SW846 6020	Cadmium	0.0026			mg/L
MW-2	GW	12-Jul-06	SW846 6020	Cadmium	0.000071	B		mg/L
MW-2	GW	12-Jul-06	SW846 6020	Cadmium	0.00041	B		mg/L
MW-2	GW	18-Aug-05	6010B	Copper	ND			mg/L
MW-2	GW	02-Nov-05	SW846 6020	Copper	0.00087	B		mg/L
MW-2	GW	02-Nov-05	SW846 6020	Copper	0.0011	B		mg/L
MW-2	GW	24-Jan-06	SW846 6020	Copper	ND	U		mg/L
MW-2	GW	24-Jan-06	SW846 6020	Copper	ND	U		mg/L
MW-2	GW	12-Apr-06	SW846 6020	Copper	ND	U		mg/L
MW-2	GW	12-Apr-06	SW846 6020	Copper	0.058			mg/L
MW-2	GW	12-Jul-06	SW846 6020	Copper	ND	U		mg/L
MW-2	GW	12-Jul-06	SW846 6020	Copper	0.0076			mg/L
MW-2	GW	02-Nov-05	MCAWW 130.2	Hardness, as	650			mg/L
MW-2	GW	24-Jan-06	MCAWW 130.2	Hardness, as	920	Q		mg/L
MW-2	GW	12-Apr-06	MCAWW 130.2	Hardness, as	650			mg/L
MW-2	GW	12-Jul-06	MCAWW 130.2	Hardness, as	2900	Q		mg/L
MW-2	GW	18-Aug-05	6010B	Lead	ND			mg/L
MW-2	GW	02-Nov-05	SW846 6020	Lead	0.0076	J		mg/L
MW-2	GW	02-Nov-05	SW846 6020	Lead	0.0026	J		mg/L
MW-2	GW	24-Jan-06	SW846 6020	Lead	0.0077			mg/L
MW-2	GW	24-Jan-06	SW846 6020	Lead	0.0021			mg/L
MW-2	GW	12-Apr-06	SW846 6020	Lead	0.0019	J	U	mg/L
MW-2	GW	12-Apr-06	SW846 6020	Lead	0.3			mg/L
MW-2	GW	12-Jul-06	SW846 6020	Lead	0.0016			mg/L
MW-2	GW	12-Jul-06	SW846 6020	Lead	0.04			mg/L
MW-2	GW	18-Aug-05	6010B	Zinc	0.014	B		mg/L
MW-2	GW	02-Nov-05	SW846 6020	Zinc	0.16			mg/L
MW-2	GW	02-Nov-05	SW846 6020	Zinc	0.14	J		mg/L
MW-2	GW	24-Jan-06	SW846 6020	Zinc	0.16			mg/L
MW-2	GW	24-Jan-06	SW846 6020	Zinc	0.15			mg/L
MW-2	GW	12-Apr-06	SW846 6020	Zinc	0.14	J		mg/L
MW-2	GW	12-Apr-06	SW846 6020	Zinc	1.8			mg/L
MW-2	GW	12-Jul-06	SW846 6020	Zinc	0.15			mg/L
MW-2	GW	12-Jul-06	SW846 6020	Zinc	0.31	J		mg/L
MW-3	GW	18-Aug-05	6010B	Arsenic	0.022			mg/L
MW-3	GW	02-Nov-05	SW846 6020	Arsenic	0.015			mg/L
MW-3	GW	02-Nov-05	SW846 6020	Arsenic	0.0098			mg/L
MW-3	GW	24-Jan-06	SW846 6020	Arsenic	0.014			mg/L

ATTACHMENT H

Operable Unit 3
Previous Environmental Sampling Summary Statistics

Table 3-2. Summary Statistics for Chemicals Measured in Soil

Chemical	Number of Detects	Total Number of Samples	Detection Frequency	Concentration [1] (mg/kg)		
				Minimum	Maximum	Average
Aluminum	123	123	100%	1400	46000	23000
Antimony	5	123	4%	0.5	85	1.3
Arsenic	111	123	90%	0.5	2900	30
Barium	123	123	100%	11	1600	280
Beryllium	81	123	66%	0.25	2.5	0.64
Cadmium	37	123	30%	0.25	510	8.2
Calcium	123	123	100%	600	80000	10000
Chromium	123	123	100%	2.2	71	14
Cobalt	122	123	99%	0.5	61	8.3
Copper	123	123	100%	2.8	3900	120
Iron	123	123	100%	3300	140000	22000
Lead	122	123	99%	0.4	1600	58
Magnesium	123	123	100%	330	9300	3900
Manganese	123	123	100%	30	3600	370
Mercury	30	123	24%	0.016	1.6	0.073
Nickel	118	123	96%	2	100	12
Potassium	121	123	98%	150	3900	1900
Selenium	3	123	2%	0.65	4	0.71
Silver	17	123	14%	0.5	29	1.2
Sodium	92	123	75%	250	10000	1300
Thallium	5	123	4%	0.6	12	0.75
Vanadium	123	123	100%	4.6	73	39
Zinc	123	123	100%	14	3500	160

[1] Nondetects adjusted to 1/2 detection limit

Table 3-4. Summary Statistics for Chemicals Measured in Groundwater

Chemical	Analysis Type	Number of Detects	Total Number of Samples	Detection Frequency	Concentration [1] (ug/L)		
					Minimum	Maximum	Average
Aluminum	Dissolved	2	16	13%	50	110	54
	Total Recoverable	11	12	92%	50	350000	34500
Antimony	Dissolved	1	16	6%	1	2.5	1.1
	Total Recoverable	1	12	8%	1	48	4.3
Arsenic	Dissolved	15	16	94%	0.5	33	4.7
	Total Recoverable	10	12	83%	0.5	12000	1000
Barium	Dissolved	16	16	100%	23	310	59
	Total Recoverable	12	12	100%	20	1400	210
Beryllium	Dissolved	0	16	0%	0.5	0.5	0.5
	Total Recoverable	2	12	17%	0.5	26	2.6
Cadmium	Dissolved	14	16	88%	0.5	1800	130
	Total Recoverable	11	12	92%	0.5	7400	710
Calcium	Dissolved	16	16	100%	66000	630000	280000
	Total Recoverable	12	12	100%	66000	740000	320000
Chromium	Dissolved	3	16	9%	1	5	4.5
	Total Recoverable	3	12	17%	2	460	44
Cobalt	Dissolved	6	16	38%	5	36	10
	Total Recoverable	4	12	33%	5	200	28
Copper	Dissolved	6	16	38%	4	31	11
	Total Recoverable	6	12	50%	5	16000	3200
Iron	Dissolved	5	16	31%	50	25000	1900
	Total Recoverable	12	12	100%	100	1100000	100000
Lead	Dissolved	2	16	13%	1.4	2.3	1.8
	Total Recoverable	4	12	33%	1.5	16000	4300
Magnesium	Dissolved	16	16	100%	5000	66150	32000
	Total Recoverable	12	12	100%	6700	150000	47000
Manganese	Dissolved	14	16	88%	3	8200	1400
	Total Recoverable	12	12	100%	20	23000	2500
Mercury	Dissolved	0	16	0%	0.03	0.1	0.031
	Total Recoverable	1	12	8%	0.03	19	1.6
Nickel	Dissolved	2	16	13%	20	37	22
	Total Recoverable	3	12	25%	20	850	100
Potassium	Dissolved	16	16	63%	1500	14000	6500
	Total Recoverable	7	12	58%	1500	92000	13000
Selenium	Dissolved	2	16	13%	7.1	11	7.7
	Total Recoverable	2	12	17%	7.5	39	10
Silver	Dissolved	0	16	0%	0.2	1	0.4
	Total Recoverable	2	12	17%	2.2	220	23
Sodium	Dissolved	16	16	100%	68500	660000	400000
	Total Recoverable	12	12	100%	62000	900000	460000
Thallium	Dissolved	2	16	13%	0.5	2	0.6
	Total Recoverable	2	12	17%	0.5	320	36
Vanadium	Dissolved	2	16	13%	5	12	5.9
	Total Recoverable	3	12	25%	5	540	55
Zinc	Dissolved	11	16	69%	10	10300	800
	Total Recoverable	9	12	75%	10	85000	8200

[1] Nondetects adjusted to 1/2 detection limit

Table 3-6. Summary Statistics for Chemicals Measured in Groundwater (Off-Site)

Chemical	Analysis Type	Number of Detects	Total Number of Samples	Detection Frequency	Concentration[1] (ug/L)		
					Minimum	Maximum	Average
Aluminum	Dissolved	7	21	33%	50	300	110
	Total Recoverable	19	21	90%	60	368000	46500
Antimony	Dissolved	0	21	0%	1	1	1
	Total Recoverable	0	19[2]	0%	1	1	1
Arsenic	Dissolved	11	110	10%	0.5	20	2.9
	Total Recoverable	24	31	77%	0.5	60	17
Barium	Dissolved	21	21	100%	16	310	120
	Total Recoverable	21	21	100%	74	3360	650
Beryllium	Dissolved	0	21	0%	0.5	0.5	0.5
	Total Recoverable	12	21	57%	0.3	28	3.7
Cadmium	Dissolved	97	110	88%	0.5	120	25
	Total Recoverable	31	33	94%	0.5	320	64
Calcium	Dissolved	21	21	100%	65000	640000	185000
	Total Recoverable	21	21	100%	100000	630000	180000
Chromium	Dissolved	0	21	0%	5	5	5
	Total Recoverable	15	21	71%	5	900	190
Cobalt	Dissolved	3	21	14%	5	33	6.9
	Total Recoverable	13	21	62%	5	180	39
Copper	Dissolved	0	21	0%	5	5	5
	Total Recoverable	16	21	76%	5	710	92
Iron	Dissolved	16	21	76%	50	1000	280
	Total Recoverable	20	21	95%	50	810000	85000
Lead	Dissolved	6	98	7%	1.5	37	3.1
	Total Recoverable	28	31	90%	1.5	830	84
Magnesium	Dissolved	21	21	100%	12900	83000	33000
	Total Recoverable	21	21	100%	14000	120000	41000
Manganese	Dissolved	20	21	95%	5	3700	650
	Total Recoverable	21	21	100%	15	16000	3600
Mercury	Dissolved	0	21	0%	0.1	0.1	0.1
	Total Recoverable	3	21	14%	0.1	1.3	0.17
Nickel	Dissolved	0	21	0%	20	20	20
	Total Recoverable	10	21	48%	20	330	53
Potassium	Dissolved	20	21	95%	5530	32000	17000
	Total Recoverable	21	21	100%	3330	43000	20000
Selenium	Dissolved	0	21	0%	7.5	7.5	7.5
	Total Recoverable	3	21	14%	7.5	40	10
Silver	Dissolved	0	21	0%	5	5	5
	Total Recoverable	0	21	0%	5	5	5
Sodium	Dissolved	21	21	100%	120000	660000	260000
	Total Recoverable	21	21	100%	150000	610000	240000
Thallium	Dissolved	0	21	0%	0.5	0.5	0.5
	Total Recoverable	5	21	24%	0.5	3.5	0.81
Vanadium	Dissolved	0	21	0%	5	5	5
	Total Recoverable	13	21	62%	5	1030	120
Zinc	Dissolved	101	110	92%	4	350	120
	Total Recoverable	33	33	100%	37	4900	330

(1) Non-detects reported as 1/2 detection limit

(2) Of the 19 results for antimony, 6 were "R" qualified (rejected) during validation and excluded from the data set used for the remedial investigation.

Table 3-7. Summary Statistics for Chemicals Measured in Surface Water (Storm Drain Outfall)

Chemical	Analysis Type	Number of Detects	Total Number of Samples	Detection Frequency	Concentration [1] (ug/L)		
					Minimum	Maximum	Average
Aluminum	Total Recoverable	1	2	50%	50	230	140
Antimony	Total Recoverable	0	2	0%	1	1	1
Arsenic	Total Recoverable	1	2	50%	0.5	1	0.75
Barium	Total Recoverable	2	2	100%	33	34	34
Beryllium	Total Recoverable	0	2	0%	0.5	0.5	0.5
Cadmium	Total Recoverable	2	2	100%	4.6	5.3	5
Calcium	Total Recoverable	2	2	100%	60000	70000	65000
Chromium	Total Recoverable	0	2	0%	5	5	5
Cobalt	Total Recoverable	0	2	0%	5	5	5
Copper	Total Recoverable	0	2	0%	5	5	5
Iron	Total Recoverable	2	2	100%	150	240	200
Lead	Total Recoverable	0	2	0%	1.5	1.5	1.5
Magnesium	Total Recoverable	2	2	100%	12000	12000	12000
Manganese	Total Recoverable	0	2	0%	5	5	5
Mercury	Total Recoverable	0	2	0%	0.1	0.1	0.1
Nickel	Total Recoverable	0	2	0%	20	20	20
Potassium	Total Recoverable	0	2	0%	1500	1500	1500
Selenium	Total Recoverable	0	2	0%	7.5	7.5	7.5
Silver	Total Recoverable	0	2	0%	5	5	5
Sodium	Total Recoverable	2	2	100%	150000	170000	160000
Thallium	Total Recoverable	0	2	0%	0.5	0.5	0.5
Vanadium	Total Recoverable	0	2	0%	5	5	5
Zinc	Total Recoverable	2	2	100%	22	25	24

(1) Nondetects adjusted to 1/2 detection limit

FIGURES

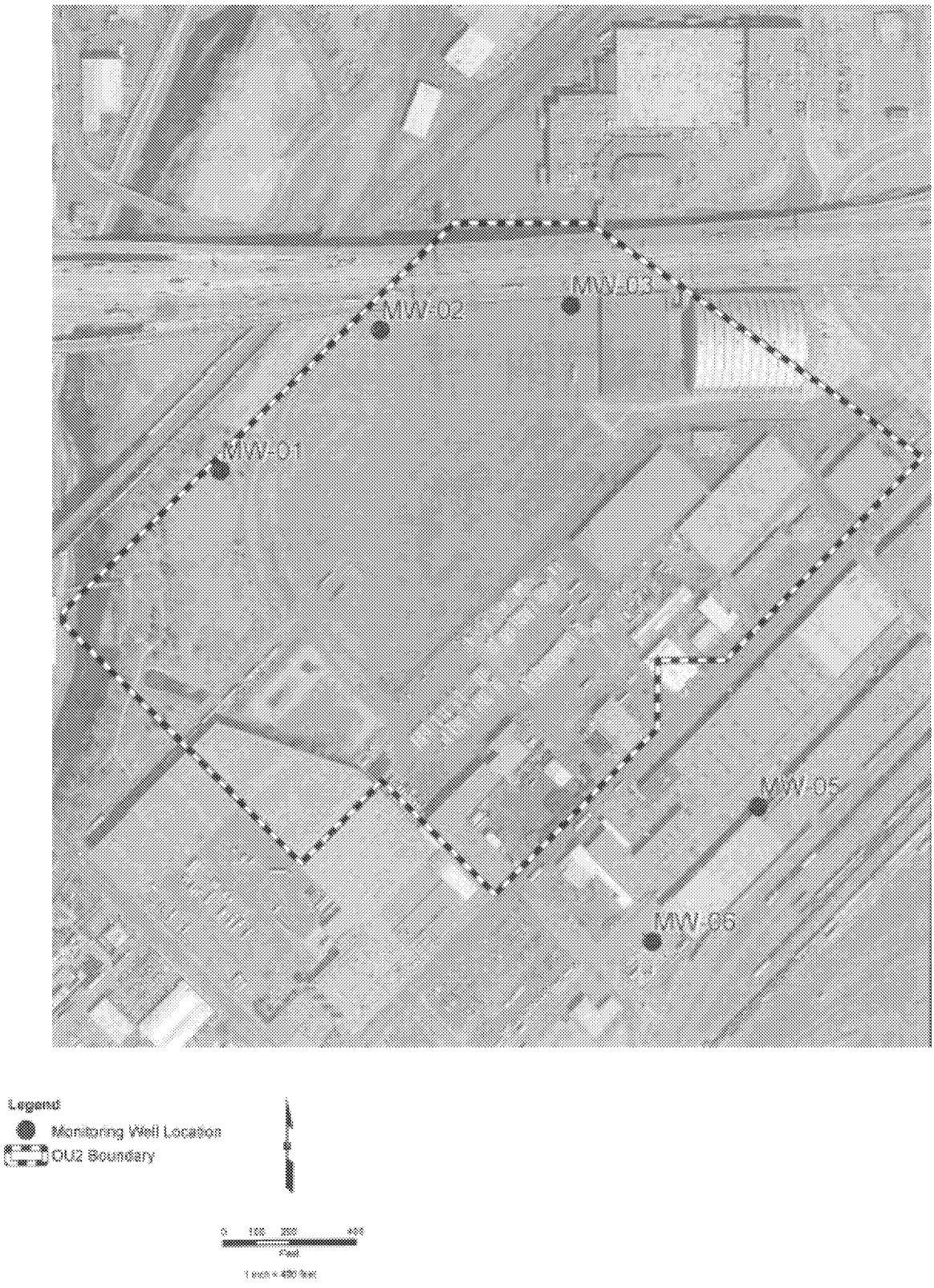

Figure 3. Site Layout Map for Operable Unit 2

Google

Directions to 9191 Grant St, Denver, CO 80229
7.0 mi – about 13 mins
North Suburban Medical Center - Health One
9191 Grant Street
Thornton, CO

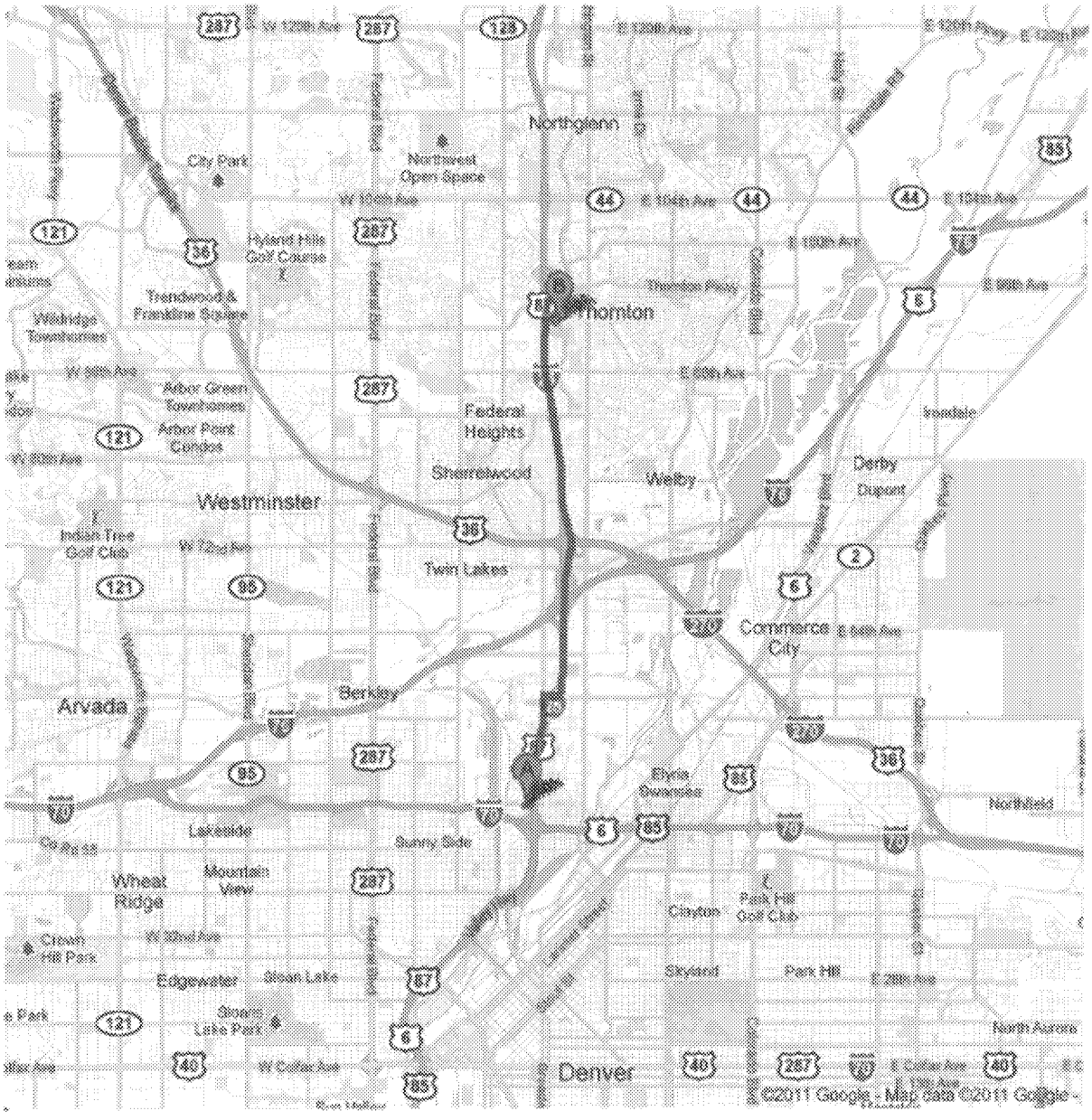

Figure 4. Route from Site (A) to Hospital (B)

North